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TRANSACTIONS & STUDIES
of
The College of Physicians of Philadelphia

Volume 41
(Fourth Series)

Number 1
(July 1973)

Improving Our Criminal Justice System[1]

By ARLEN SPECTER[2]

Americans are looking to their public officials—the police, prosecutors, judges and correctional authorities—to find answers to the problem of violent crime which confronts this nation.

After fifteen months of deliberation and debate, the National Advisory Commission on Criminal Justice Standards and Goals recently completed its blueprint for vast improvements in the criminal justice system in the United States. I served as a member of that Commission. We approached our task with the realization of the deep and destructive impact that violent crime has on the quality of life in America, especially in our major cities.

To paraphrase President Franklin Delano Roosevelt—what we have to fear is fear itself.

Referring to New York City, the *National Observer* has characterized that city's crime problems as "fear by day, terror by night." The *Observer* made the point that the after-dark fear of the Bedford-Stuyvesant ghetto has now moved into the elegant apartments on Sutton Place. The *Observer* quotes Herman Glaser, former president of the New York Trial Lawyers Association and a man who was mugged and robbed in broad daylight just off Madison Avenue, as saying, "There were about 100 people on the street, but nobody came to help me. Nobody."

This public paralysis is the shameful legacy of the 1960s when our population grew by 13% while the incidence of serious crime in America increased by 148%. Our citizens not only stand mute on the streets, but stay fearful in their homes at night.

A recent *Newsweek Magazine* analyzed the consequences of America's "fortress mentality." A generation ago, that would have meant concern about attack from powers outside our borders instead of prowlers inside our bedrooms. The *Newsweek* article catalogued the increasing insignias of a frightened society: "Four locks on an apartment door, the evening bridge game abandoned, cabs and buses that no longer make change, the armed guard inside a junior high school—and with nearly everyone, a perpetual feeling of vulnerability."

To confront this problem, America has produced a criminal justice system where

[1] Section on Insurance Medicine, The College of Physicians of Philadelphia, 11 April 1973.

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criminals too seldom go to trial, too frequently evade conviction and too rarely go to prison. The unhappy result is more crime in the streets and more confusion in the courts.

But the problem of violent crime is susceptible to long-range solution and short-range improvement. While moving to eliminate the underlying causes of crime, we can put into operation reasonably immediate reforms in the criminal justice system to: 1., make the speedy trial a reality so that criminal defendants are tried within a few weeks instead of months or years; 2., obtain adequate sentences for the guilty; and 3., provide a correctional system with realistic rehabilitation to curtail the plague of revolving door justice where defendants move through crimes, the courts and corrections, and then right back to crime again.

The National Commission on Criminal Justice Standards and Goals has proposed specific reforms to make it happen—providing its recommendations are properly implemented.

The first step in moving away from what has become a commitment of confusion is to move toward the elimination of trial delay. The speedy trial is a myth. The detention centers are bulging. The defendant's right to a speedy trial is found only in the Constitution; it cannot be found in the criminal courtrooms of our big cities.

The delay in the trial of criminal cases is the most pressing problem facing the Prosecuting Attorney of any large city. In far too many instances, the district attorney's hardest job is not convicting the guilty but bringing a defendant to trial in the first place.

While defendants are on bail for months and months, too many commit more crimes of violence. The hard answer is not to deny the defendants the right to bail, but to deny the court system the self-asserted privilege to trial delay.

To make the speedy trial a reality, the court system needs more manpower, muscle and methodology. If Americans continue to spend more money on cosmetics than on courtrooms, they may be beautiful but they won't be safe.

But more money alone is not the answer. Public officials cannot continue the perpetual plea for more money without applying creative innovations to reform the administration of the criminal courts.

To solve the massive problem of backlog, court resources must be increased, but even more fundamentally court caseloads must be decreased. As a first step, cases should be screened by the prosecuting attorney before arrests are made by the police. Through such review, cases can be dropped at the police stations before they are dragged through the courts. Court time should not be wasted where the evidence is clearly insufficient to convict or the evidence must be suppressed because it was obtained by unconstitutional means.

We have put this case-screening concept into operation in Philadelphia with a pilot project funded by the Law Enforcement Assistance Administration. Assistant district attorneys have been assigned around the clock in selected police districts. These prosecutors review every criminal complaint prior to arrest and every search warrant affidavit prior to execution. Our statistics show that we reject one-third of all the cases which are brought to us by the police for review.

A second diversionary program has the potential to divert large numbers of cases from the trial courts where experience shows that jail sentences are not required. This program, called Accelerated Rehabilitative Disposition, removes from the trial docket those cases involving defendants with no previous record or an

insignificant prior record who are charged with non-violent criminal offenses. After a brief, informal conference, defendants are placed on probation with the stipulation that the charges will be dropped if they stay out of trouble for a year or two, as designated by the conference judge.

While it might be preferable to decriminalize some of these charges, that requires lengthy proceedings through indifferent state legislatures. The prosecutor has ample discretion, and should use it, to segregate out the cases which do not have sufficient priority to compete with violent crimes for the attention of the trial courts.

After two years of successful operation in Philadelphia, where more than 12,000 cases have been handled through this program, the Supreme Court of Pennsylvania has promulgated rules which establish detailed procedures for district attorneys around the state to divert cases through Accelerated Rehabilitative Disposition.

As a third means of streamlining the trial process on lesser cases, we amended our Pennsylvania State Constitution in 1968 to establish a new municipal court where lesser charges could be tried without indictment or jury trial. The great majority of these cases are tried at their first or second listing. During the first two years of operation, the average length of time between arrest and trial in Municipal Court was only 44 days.

In 1972, 42,500 cases were tried in the Philadelphia Municipal Court. While defendants have a right to trial *de novo* with a jury after indictment on an appeal from a municipal court conviction, this right to appeal was exercised in only approximately 12% of these cases.

By use of such innovations, it is possible to meet the Commission's proposed standard of sixty days from arrest to trial.

Through the use of these reforms, Philadelphia's criminal backlog has been reduced from 11,645 cases in 1965 to 5,079 cases in 1972. This reduction in backlog has been achieved in the face of a firm policy against wholesale dispositions through plea bargaining. Contrasted with some other major American cities where more than 90% of cases are concluded by guilty plea, we have disposed of only 32% of our cases in Philadelphia through the guilty plea.

Once we have isolated the important cases which require a determination of innocence or guilt and call for tough sentences for criminals convicted of tough crimes, those cases should go to trial without plea bargaining. The long-standing reliance on plea negotiations to break up the logjam of the criminal docket destroys the adversary process, denies essential Constitutional rights and diminishes the prospect of sentencing for the violent recidivist.

In practical application, plea bargaining often turns into a sophisticated form of the coerced confession. All too often defendants are faced with the choice of: 1., confess, through the guilty plea, and walk out of court free on probation; or 2., stay in jail for weeks or months awaiting a trial assignment and then face a much longer sentence if convicted. While all condemn the rack and thumbscrew confessions of fifteenth-century Spain, our judicial system daily encourages its twentieth-century counterpart—plea bargaining.

An unhappy by-product of this courtroom bargaining is the cynicism which it engenders in the defendant. Serving time on a charge that has little relation to reality corrodes and complicates the tasks of rehabilitation and correction. This finding appears in the Report of the recent New York State Special Commission on Attica which concluded: "What makes inmates most cynical

about their pre-prison experience is the plea-bargaining system. . ."

The pressures of plea bargaining are totally destructive of the prosecutor's effort to obtain tough sentences for tough criminals. The district attorney should not be coerced by a crushing backlog to give away City Hall in order to avoid trial through the guilty plea.

Experience with plea bargaining in many jurisdictions has taught us the painful lesson, again and again, that the violent criminal who secures his freedom through plea bargaining is often encouraged to rob or rape again. The practical effect of plea bargaining unquestionably results in the violent recidivist receiving less than an adequate prison sentence.

Because of crushing backlogs in the criminal courts, the system has surrendered to the apparent necessity for plea bargaining. Plea bargaining received its ultimate sanction a year ago when Chief Justice Warren Burger wrote in a United States Supreme Court opinion:

> "The disposition of criminal charges by agreement between the prosecutor and the accused, sometimes loosely called 'plea bargaining,' is an essential component of the administration of justice. Properly administered, it is to be encouraged."

I submit to you, respectfully, that Chief Justice Burger is wrong and the system is wrong which clings to life through the artificial respiration of plea bargaining. The National Commission is both correct and courageous in demanding an end to plea bargaining.

The bitter experience of our criminal courtrooms has demonstrated that the bargained plea is really no bargain. We should not settle for a system which simultaneously deprives the innocent defendant of the forum where the prosecutor is compelled to prove his case and the public is victimized by excessive leniency for hard-core criminal repeaters.

Through case screening and diversion plus increased court resources, we must be prepared to try the serious criminal cases. Our criminal justice system must be updated from the horse and buggy era, where horse trading for guilty pleas has tainted the system and degraded its participants.

In calling for the elimination of plea bargaining in five years, the Commission has sounded the clarion call for the most fundamental of reforms in the criminal justice system. Following appropriate sentencing for the violent recidivist, the correctional system must then be in a position to provide realistic rehabilitation. These reforms will provide the best opportunity for dealing with the problems of violent crime while protecting Constitutional safeguards for those accused of crimes.

Our first President, moving quickly in his first term to enact legislation establishing our judiciary, stated: "Impressed with the conviction that the true administration of justice is the firmest pillar of good government, I have considered the first arrangement of the Judicial Department as essential to the happiness of our country and the stability of its political system." In the finest tradition of that excellent advice, we should move forward on what George Washington started out to do—make our courts effective, even-handed agents of justice.

It may be possible that the fear which is rampant in our cities today is the catalyst required to cause our collective efforts to catch fire. The message of the National Commission is not blowing in the wind; it is written on the face of every citizen in this country who thinks he has a better chance of getting jumped in the streets than of getting justice in the courts.

Some of the problems have been defined and overdefined. The battle to overcome these problems will not be won in a day or perhaps even in a decade. Our efforts and concern at improving our system of criminal justice must be matched by efforts and concern at improving our system of social justice. We cannot overlook the ills of air and water pollution, or of inadequate food and housing for the poor in our cities, or of low-grade education in an era which demands high-grade skills. If you were to mark on a map the areas in our country where there is poor housing, inadequate education, poverty, and crime, you would be pointing to the same place every time.

For this reason, we must help our nation's poor not out of charity, but out of choice; not solely with money, but also with motivation; not because we are afraid of their increasing hostility, but because we are aware of our increasing responsibility. For the real greatness of a nation must be measured against the wealth, not of its richest citizens, but of its poorest.

In closing, may I remind you of the famous colloquy in ancient Athens where an Athenian citizen asked one of the political leaders the same question we are asking here today: "When will there be justice in Athens?" The famous reply: "We will have justice in Athens only when those who have not suffered injustice are as outraged as those who have."

Only a sense of outrage can generate sufficient concern and action to reform our criminal justice system. Let America be the master of outrage by acting on it to secure justice in our courts instead of being the victim of outrage by suffering violence in our streets.

Homeostasis and the Prostaglandins[1]

By JAMES B. LEE, M.D.[2]

The prostaglandins are a ubiquitous group of fatty acids whose biological activity was independently demonstrated in the early 1930s by Kurzrok and Lieb (1), M. W. Goldblatt (2) and U.S. von Euler (3). These investigators showed that extracts of human or sheep semen and sheep seminal vesicles resulted in contraction of non-vascular smooth muscle, such as the uterus, and lowering of blood pressure in the rat. von Euler further characterized them as fatty acids and named them "prostaglandin" in 1935 (4). These early reports did not receive the recognition they merited, and the field of prostaglandin research remained relatively quiescent for almost 25 years because of the lack of adequate methodology for their isolation and identification as well as circumstances surrounding World War II. However, in 1960, Bergström and Sjövall isolated and identified two classes of prostaglandins called PGE (5) and PGF (6). Since that time the literature on prostaglandin research has mushroomed from a solitary article in 1961 to 1,900 publications in 1972 (Figure 1).

The basic structure of PGE and PGF classes is shown in Figure 2. All prostaglandins have a basic 20-carbon chain with a carboxyl group and a cyclopentane ring. This hypothetical compound is referred to as prostanoic acid. The PGE class contains a keto at position 9 and a hydroxyl at position 11 in the five-membered ring. They are named PGE_1, PGE_2 and PGE_3, depending on the number of double bonds in the aliphatic side chains. With certain exceptions these three exhibit the same biological activities, notably, lowering of blood pressure *and* stimulation of non-vascular smooth muscle. The PGF class is identical to the E except that the keto in position 9 is reduced to a hydroxyl. This relatively minor chemical modification results in a loss of vaso-depressor activity but in a retention of non-vascular smooth muscle contraction. The introduction of the hydroxyl at position 9 results in the formation of two stereochemical possibilities of which only PGF_α is naturally occurring. As with the PGE class, PGF's are called $PGF_{1\alpha}$, $PGF_{2\alpha}$ and $PGF_{3\alpha}$, depending on the number of double bonds in the side chains. Although all three configurations have been demonstrated, PGE_2 and $PGF_{2\alpha}$ appear to be the predominant naturally occurring compounds.

The rather astounding recent growth in the biological literature may be attributed to the fact that aside from smooth muscle activities, PGE and PGF have remarkable other effects on virtually every cell, tissue or organ system where they have been evaluated. Depending on the organ involved and the particular PG, they have been shown to be possible neurotransmitters in the central nervous system . . . produce an increase in intraocular tension . . . cause contraction of the iris of the eye mediating light-induced meiosis . . . decrease nasal congestion . . . produce bronchiolar relaxation and increase

[1] Mary Scott Newbold Lecture CIV, The College of Physicians of Philadelphia, 7 March 1973.

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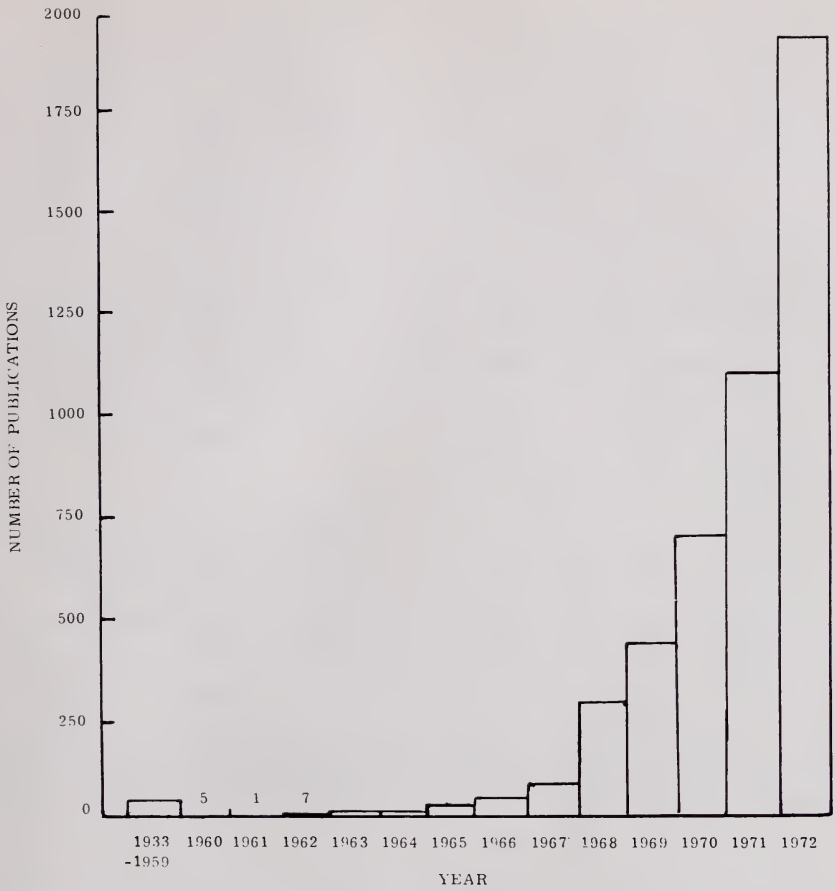

Fig. 1. There is an almost exponential rise in articles dealing with the prostaglandins from a solitary article in 1961 to approximately 1900 articles in 1972. Based on MEDLARS tally by courtesy of Dr. Martin M. Cummings.

pulmonary blood flow . . . inhibit gastric hydrochloric acid secretion in animals and man and experimental ulcer production in animals . . . stimulate the intestines to contract and inhibit intestinal sodium and water transport leading to a cholera-like diarrhea . . . increase thyroid and adrenal hormonogenesis, simulating the actions of the trophic hormones . . . produce oxytocic-like contraction of the uterus leading to expulsion of the fetus . . . produce abortion at all stages of pregnancy by virtue of their luteolytic properties and direct oxytocic action . . . inhibit or enhance platelet aggregation. This compilation is by no means complete but gives some indication as to why such an explosive research activity has occurred in the various disciplines of biology and medicine. Their ubiquitous distribution suggests a role for them in virtually every cellular and organ system.

The PGE and PGF class interact in many instances with the adenylcyclase-cyclic-AMP system (C-AMP), in some instances increasing and in others decreasing C-AMP. In cases where there is an increase, there is a rise in target cell function (the effect of PGE_2 to increase platelet aggregation is associated with a rise in C-AMP), and in situations where

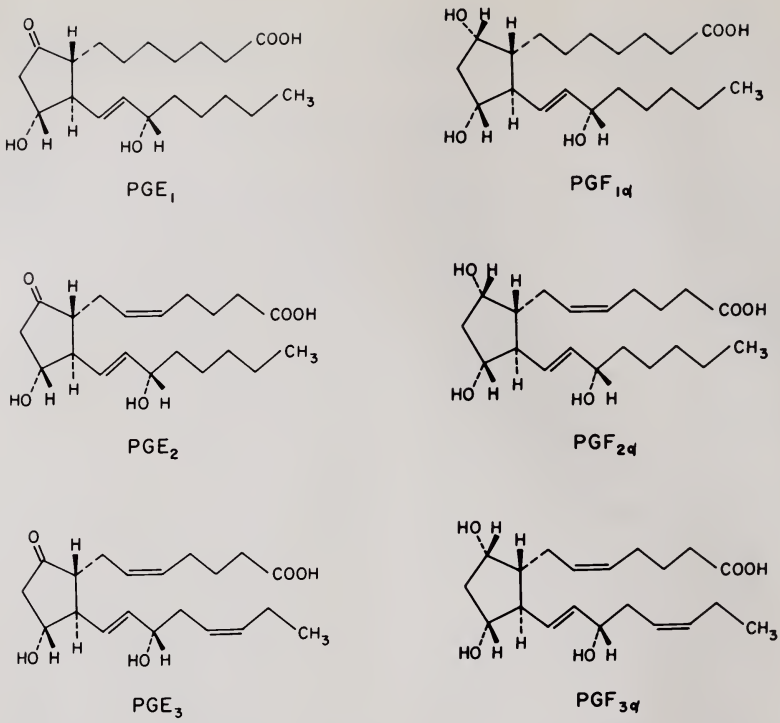

Fig. 2. The structures of the PGE and PGF class of prostaglandins. In the PGE group note the keto at position 9 in the five-membered ring and hydroxyl at position 11. PGF is identical to the corresponding PGE except that the keto in the five-membered ring at position 11 is reduced to a hydroxyl.

there is a decrease, there is a fall in target cell functions (the effect of PGE_2 to inhibit norepinephrine induced lipolysis is accompanied by a decrease in C-AMP.)

Prostaglandins have been shown to be synthesized from unsaturated fatty acids catalyzed by the enzyme PG synethase. PGE_1 and $PGF_{1\alpha}$ are derived from dihomo-γ-linolenic acid, PGE_2 and $PGF_{2\alpha}$ from arachidonic acid. Interestingly, Vane has shown that non-steriodal anti-inflammatory agents such as aspirin and indomethocin markedly inhibit PG synethase (7). In fact, he has proposed that many of the effects of aspirin are the results of decreased prostaglandin activity including the increase in hydrochloric acid, relief of headache and alleviation of fever, the reverse of which can be produced under the appropriate circumstances by certain prostaglandins in man.

The implication for an important role for these compounds in widely diverse fields of interests in medicine is obvious. However, I would like to restrict this discussion to the renomedullary prostaglandins and a possible role for them in the regulation of blood pressure and sodium and water homeostasis. It has long been known but generally little appreciated that, in addition to its well known prohypertensive action (in particular, the exhaustive studies into the renal renin-angiotensin-aldosterone axis), the kidney also exerts an antihypertensive function. Evidence for this activity is, first, that removal of both kidneys results in a salt dependent renoprival hypertension which is obviously not on

the basis of a renal renin mechanism (8). That such an effect is not a non-specific occurrence of the associated uremia was the finding by Grollman *et al.* that, with anastamosis of the ureters into the inferior cava of animals (in which the same degree of uremia occurs as in the renoprival situation), hypertension does not develop even on saline loading (9). This finding demonstrated that renoprival hypertension is not a non-specific effect of the uremia but that it is a specific function which is dependent on non-excretory but perfused areas within the kidney.

Secondly, it is difficult to achieve renovascular hypertension by such procedures as partial renal arterial occlusion, compression of the renal parenchyma, etc., without removing the opposite kidney, and this fact implicates a "protective" antihypertensive action of the uninvolved kidney. In addition, transplantation of a normal kidney into animals with renoprival or renovascular hypertension or humans with renoprival hypertension is associated with a fall in blood pressure to or toward normotension (10, 11). Thirdly, circulating agents have never been demonstrated in human essential hypertension or animals with chronic renovascular hypertension sufficient to account for the observed elevation in blood pressure. Although animals with renovascular hypertension acutely show elevation in circulating renin, this subsides in weeks or months, although hypertension is maintained (12).

Lastly, the kidney has long been suspected to contain vasodepressor and antihypertensive compounds. Grollman *et al.* (13) and Page *et al.* (14) in the early 1940s observed antihypertensive effects of whole kidney extracts to animals and humans, although the effects were probably in large part secondary to associated anaphylactic reactions. Hamilton and Grollman believed the activity was a peptide and resided in the cortex (15), whereas Muirhead demonstrated that extracts and implants of sheep renal medulla prevented acute saline-dependent renoprival hypertension in dogs (16).

Our own interest in hypertension as a possible deficiency disease was aroused one day in 1957 when on rounds with Dr. Garfield Duncan at the Pennsylvania Hospital here in Philadelphia. During the discussion of a case of hypertension, a disorder in which Dr. Duncan had an abiding interest, he suggested the possibility that essential hypertension might be a result of a deficiency of vasodilators rather than solely an excess of vasopressors. The chief drawback to the theory, he said, was the failure to detect circulating or tissue vasodilators with potent arteriolar muscle relaxing effects. This antihypertensive function or "Deprivation Theory" is shown schematically in Figure 3. Figure 3B depicts arteriolar muscle "tone" in normotension being the result of vasodepressor agents being equally offset by vasoconstrictors. Hypertension might then result from a relative or absolute decrease in vasodepressors (Figure 3A), allowing vasopressors to act unopposed, leading to peripheral vasoconstriction and hypertension. Conversely, certain states of shock could be due to a relative deficiency of vasopressors (Figure 3C).

Several years later, in 1960, at the Peter Bent Brigham Hospital, we were studying the effects of sodium on the intermediary metabolism of slices of rabbit renal cortex and medulla *in vitro*. Mindful of the antihypertensive theory, but not of the early developments in prostaglandins, we suggested to Dr. Roger Hickler, who was investigating angiotensinase activity in the pentolinium-blocked rat, that he might wish to inject some of our media into the rat and

observe any effect on blood pressure. Although there was a rise in pressure in the media from cortex (due to its renin content) there was, to our surprise, a sharp drop in pressure with media from the medulla. Figure 4 shows that following the blood pressure fall there was a gradual return to control over a period of 10-15 minutes. Further studies revealed it to be ethanol soluble, dialyzable and of relatively small molecular weight (17). It was definitely shown not to be ATP, ADP, or bradykinin, well known vasodepressor compounds.

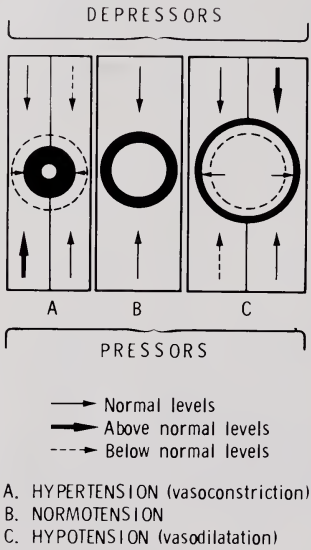

Fig. 3. Hypothetical schema of antihypertensive function of the kidney. It is evident that peripheral arteriolar vasoconstriction (A) can result from a relative or absolute deficiency of depressor mechanisms allowing pressor agents to act unopposed. Normotension may be conceived as vasopressor systems being equally offset by vasodepressor systems (B) while hypotension may result from a deficiency of vasopressors (C). Reproduced from (50) with permission of the publisher.

Although vasodepressor activity could be observed with one kidney medulla, it was so potent that it became necessary to extract kilograms of renal medulla to obtain sufficient pure material to study chemically and physiologically. In 1965, in collaboration with Drs. Covino, Takman and Smith, we observed the active compounds to be polar fatty acids, and eventually from 20 kg. of rabbit medulla we isolated three biologically active compounds (18) by a combination of solvent extraction, partition, silicic acid and reversed phase partition chromatography and finally by thin layer chromatography (Figure 5). We had become aware of the developing prostaglandin events by this time and believed the first compound (Compound 1) was a PGF from its Rf values and the fact that it contracted nonvascular smooth muscle but had no vasodepressor effects. Compound 2 was believed to be a PGE since it had both biological activities, but the third compound which we called medullin had only vasodepressor without non-vascular smooth muscle stimulating activity. Medullin was the first of what is now the third new class of prostaglandins, the PGA group,

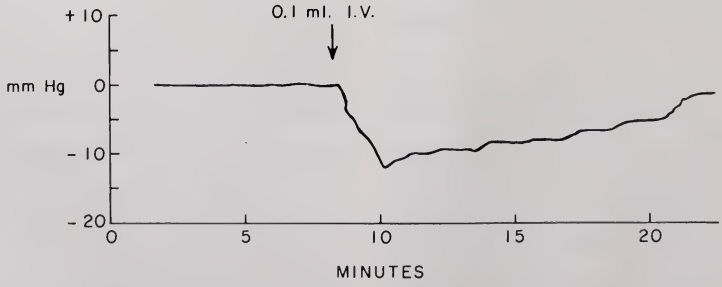

Fig. 4. Effect of incubation media with slices of rabbit renal papilla on rat blood pressure in vivo. There is a sharp fall of approximately 10 mm Hg with a gradual stepwise return to control. Reproduced from (17) with permission of the publisher.

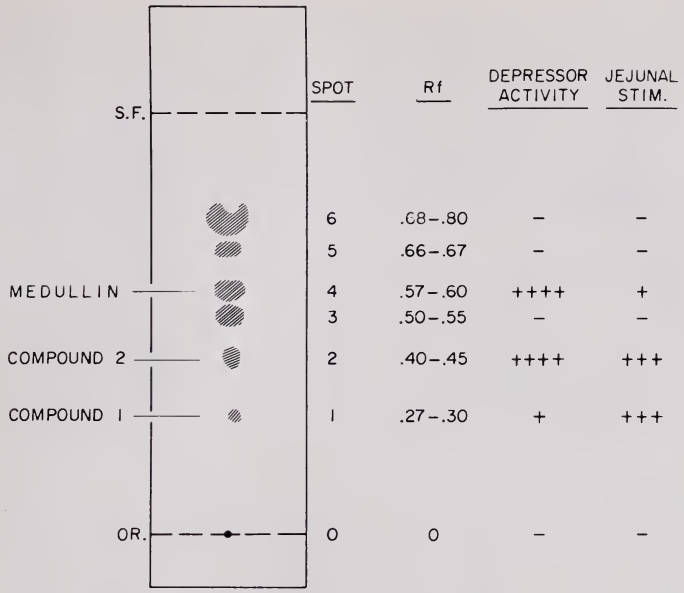

Fig. 5. Thin layer chromatography from 20 kilograms of extracted and chromatographed rabbit renal medulla. Medullin was different than Compound 1 (PGF) and Compound 2 (PGE) in that it exhibited only vasodepressor activity without non-vascular (jejunum) stimulating properties. Reproduced from (18) with permission of the publisher.

to be isolated, chemically characterized and identified. Figure 6 shows the structures of the three renomedullary prostaglandins as elucidated by non-classical means, including nuclear magnetic resonance and mass spectroscopy. Compound 1 was $PGF_{2\alpha}$, Compound 2 was PGE_2, while medullin was identified as Δ PGE_2 (PGE_2-215) (19, 20) which was renamed PGA_2 by Hamburg and Samuelson (21) to correspond to the generally used nomenclature. PGA_1 as well as PGA_2 were also described in human semen by these investigators (22).

In addition to determining the structure of the vasodepressor prostaglandins PGA_2 and PGE_2, it became of interest to delineate the mechanisms of their hypotensive effects. Early experiments (18) utilizing PGA_2, isolated from the rabbit kidney as medullin, showed that intravenous injection into a normotensive dog resulted in a significant fall in systolic and diastolic blood pressure (Table I). At the time of vasodepression, there was a rise in cardiac output, so the total peripheral resistance fell. The rise in cardiac output was almost entirely the result of an increase in heart rate, which was probably the effect of baroreceptor-mediated increase in cardiac sympathetic activity occasioned by the fall in arterial pressure. This is supported by the fact that PGA_2 was without a positive (or negative) chronotropic or inotropic effect on the isolated perfused rabbit heart.

Intraarterial injection of PGA_2 resulted in an increase in blood flow to virtually every regional vascular bed studied (carotid, coronary, mesenteric, femoral, cutaneous, brachial and renal) (23, 24). However, only with the mesenteric dilation was there a simultaneous fall in blood pressure, suggesting that the splanchnic vascular tree is a major resistance tree whose prostaglandin-mediated dilation results in a lowering of blood pressure (25). The mechanism of

TABLE I
Effect of Partially Purified Medullin, Pure Medullin, and PGE-1 on Aortic Pressure, Cardiac Output, and Total Peripheral Resistance in the Intact Dog

	Control	*Postinjection*	*Mean Difference*	*Per Cent Change*	*P**
Partially purified medullin (300 μg IV) n = 8					
Mean aortic pressure, mm Hg	143 ± 7	120 ± 6	−23 ± 4	−16	<0.01
Systolic pressure	161 ± 6	155 ± 6	−6 ± 6	−4	>0.3
Diastolic pressure	126 ± 5	86 ± 7	−40 ± 6	−32	<0.01
Pulse pressure	34 ± 2	69 ± 9	+35 ± 8	+106	<0.01
Cardiac output, liters/min	2.20 ± 0.27	2.85 ± 0.27	+0.65 ± 0.1	+30	<0.01
Total peripheral resistance, PRU	0.074 ± 0.01	0.048 ± 0.003	−.026 ± 0.006	−35	<0.01
Pure medullin (10 μg IV) n = 2					
Mean aortic pressure, mm Hg	158	129	−29	−18	
Systolic pressure	176	151	−25	−14	
Diastolic pressure	140	106	−34	−24	
Pulse pressure	36	46	+10	+28	
Cardiac output, liters/min	2.9	3.1	+0.2	+7	
Total peripheral resistance, PRU	.058	.043	−.015	−26	
PGE-1 (10 μg IV) n = 2					
Mean aortic pressure, mm Hg	156	126	−30	−19	
Systolic pressure	175	150	−25	−14	
Diastolic pressure	139	103	−36	−26	
Pulse pressure	36	46	+10	+25	
Cardiac output, liters/min	2.6	2.9	+0.3	+10	
Total peripheral resistance, PRU	.066	.046	−.020	−30	

* *P:* significance determined by Student's *t* test utilizing paired data analysis.
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arteriolar dilation is unknown but appears to be a direct effect on arteriolar smooth muscle without participation of adrenergic, cholinergic or histaminergic nerve endings (23). The dilating action of PGA_2 is in part due to physiological (but not pharmacological) antagonism of angiotension and norepinephrine.

Now I would like to concentrate on the dilatory renal prostaglandins PGA_2 and PGE_2 as possible major participants in renal regulation systems of blood pressure and sodium and water homeostasis. As with other vascular beds, PGA_2 and PGE_2 produce renal vasodilation when infused into the renal artery of normotensive dogs (Figure 7). The increase in renal blood flow is accompanied by no change in blood pressure, suggesting that the renovascular tree is not *per se* a major resistance bed. Associated with the rise in blood flow is an enhanced formation of urine from the infused but not the opposite control

kidney. This diuresis is primarily the result of an osmotic diuresis occasioned by a marked natriuresis and kaluresis which was also demonstrated for PGE_1 (26, 27).

During the natriuresis there was a fall in extraction of PAH (EPAH), suggesting a redistribution of blood flow away from cortex, possibly to renal medulla. The most likely explanation for the fall in EPAH, however, is that the PGA's and PGE's directly inhibit PAH uptake *in vitro*, which can explain the fall in EPAH *in vivo* (28). Direct proof that there is no

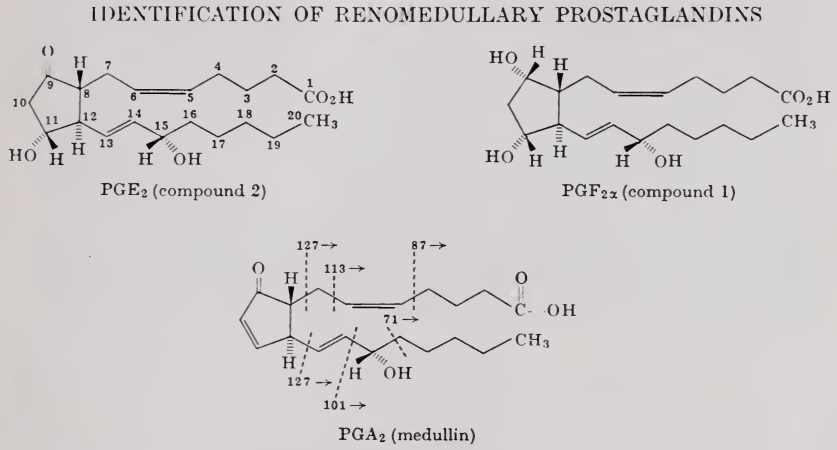

Fig. 6. Structures of the isolated prostaglandins. Suggested fragmentations for all three compounds are indicated in the structure of PGA_2. Reproduced from (20) with permission of the publisher.

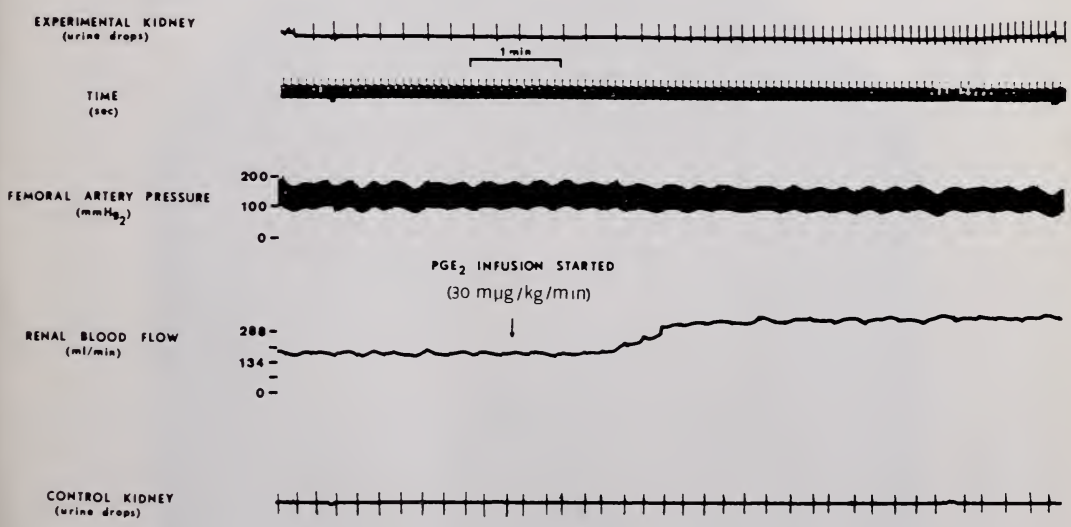

Fig. 7. The effect of infusion of PGE_2 into the renal artery. There is a two to three fold increase in renal blood flow which was not associated with any changes in systemic blood pressure. There was an increased elaboration of urine from the experimental kidney but not the opposite non-infused control kidney. Reproduced from (23) with permission of the publisher.

increase in medullary blood flow was made by Drs. Birtch and Zakheim in Dr. A. Clifford Barger's laboratory at Harvard Medical School, who showed (utilizing krypton washout, silastic injection and autoradiography) in anethesized dogs that PGA_2 resulted in a marked shift in blood flow from medulla to cortex (Figures 8, 9). This effect is not specific for PGA or PGE but has been observed under any circumstances associated with renal vasodilation and with increased sodium excretion (acetylcholine, ethacrynic acid, furosemide, etc.). Interestingly this phenomenon has also been noted during saline expansion in the dog (29). Such an increase in cortical flow during saline expansion appears to be, at least initially, the result of inner cortical blood flow (30). This has led to speculation that intrarenal PGA and/or PGE's might, in addition to regulating renal blood flow and systemic arterial pressure, mediate the natriuresis accompanying volume expansion and might serve as a natriuretic intrarenal "hormone."

Although both the PGA and PGE classes of prostaglandins lower blood pressure and induce natriuresis, there are marked differences between these two groups of compounds (Table II). Both PGA and PGE produce their hypotensive effects by peripheral arteriolar dilation; however, PGA appears to have an indirect mechanism of action, since there is a significant delay (at least 80 seconds) before blood pressure falls. In contrast, the lowering of blood pressure with PGE occurs immediately after its infusion, suggesting that this compound in itself leads to a lowering of blood pressure by peripheral arteriolar dilation (31). The delayed response (mechanism *X*) may be the result of such mechanisms as conversion of PGA to another vasodilating prostaglandin (i.e., PGC) or release of various vasoactive peptides. Secondly, the PGE (and PGF) class of compounds can hardly be considered as true circu-

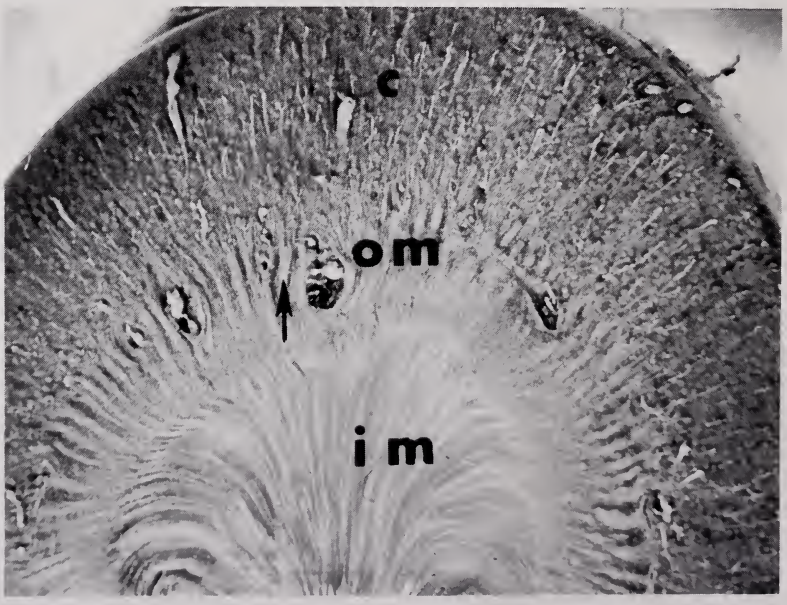

Fig. 8. Silastic injected kidney from an unanethesized normotensive dog. C = cortex, OM = outer medulla and IM = inner medulla. Note the bundles of vasorectae from peritubular capillaries which emerge to supply the outer medulla as well as inner medulla. Reproduced by courtesy of Dr. A. C. Barger.

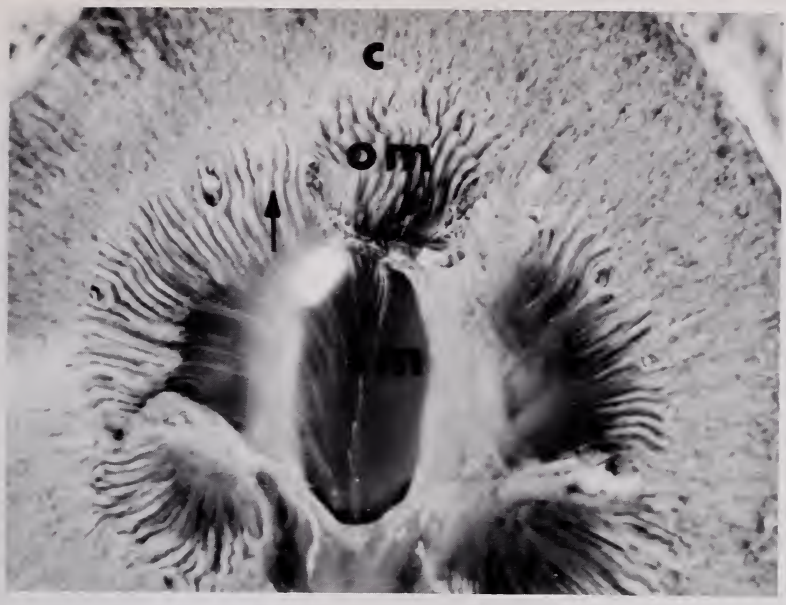

Fig. 9. Silastic injected kidney from an unanesthetized normotensive dog infused with medullin (PGA_2). Note the bundles of vasorectae which stand out in sharp contrast to a dark background occasioned by a redistribution of blood from the outer medulla to the cortex. Reproduced by courtesy of Dr. A. C. Barger.

TABLE II
Differences between PGA and PGE

	PGA	PGE
Mechanism of hypotensive effect	Indirect peripheral dilation	Direct peripheral arteriolar dilation
Metabolism by lung	Minor degree	Major degree
Renal oxidative metabolism and Na-K ATPase	Marked decrease	No effect
Effect on non-vascular smooth muscle	None	Contraction

lating hormones, as they are actively metabolized by the lung (32). On the other hand, PGA is not metabolized to a significant degree by pulmonary tissue and could qualify as a circulating hormone (32). Thirdly, PGA, but not PGE, produces a marked decrease in renal oxygen consumption, glucose incorporation into carbon dioxide and Na-K ATPase in both cortex and outer medulla (33). The natriuresis observed with PGA could therefore result not only from hemodynamic factors but also from metabolic inhibition of energy sources for sodium reabsorption. Lastly, PGA has little effect on producing contraction of non-vascular smooth muscle, in contrast to PGE which has this activity as well as hypotensive effects.

Turning to a study of the human renal prostaglandins, we, in collaboration with Drs. Vernon Vance, Anthony Prezyna, and one of our students Mr. Ahmed Attallah, have recently studied the concentration of PGA and PGE in fresh surgical specimens of human kidney (34). The prostaglandins were measured by radioimmunoassay with a modification of the method of Caldwell *et al.* (35). Figure 10 shows that PGA and PGE are present in very small amounts in renal cortex but rise to very high concentration in renal papilla, a pattern

similar to that found in other animal species. In rabbits the synthesis of PGA_2, PGE_2 and PGF_2 occurs in a unique cell called the interstitial cell. This is a sponge-like cell containing lipid droplets believed to be in precursors of prostaglandins. Dr. Prezyna has examined human renal papilla and found similar lipid laden interstitial cells in the human which presumably also secrete prostaglandins. In fact Muirhead *et al.* have shown PGA_2, PGE_2 and PGF_2 to be present in almost pure tissue cultures of interstitial cells of renal papilla (36). It is therefore not implausible that the interstitial cell may function by elaborating prostaglandins as a response to a change in sodium concentration in the hyperosmotic interstitium of the renal medulla. Dr. Prezyna (37) has also noted in at least 45% of the cases examined that there is a 3 mm nodule at the junction of papilla and outer medulla (Figure 11, arrow). This non-encapsulated nodule (previously called medullary fibroma) is occupied almost entirely by interstitial cells containing osmiophilic granules (Figure 12). This finding

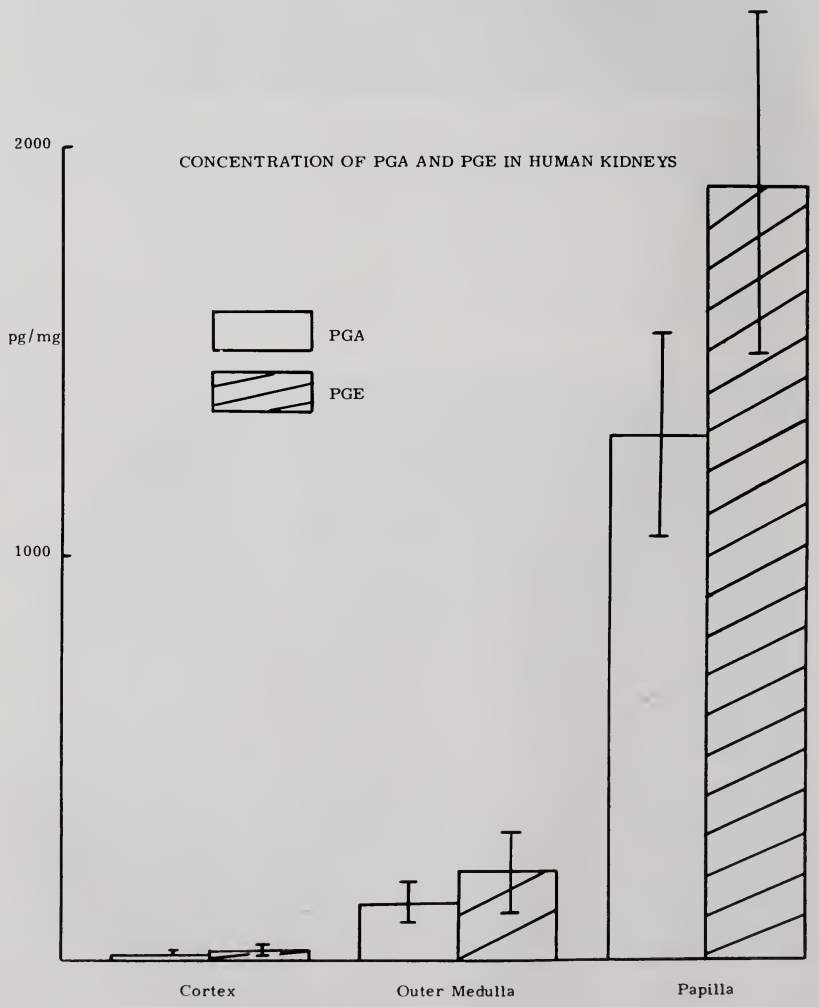

Fig. 10. Concentration of PGA in human kidneys. There is a very low concentration in cortex while that of papilla is high. Reproduced from (34) with permission of the publisher.

Fig. 11. Renomedullary nodule (arrow) at junction of papilla and outer medulla. Reproduced from (37) with permission of the publisher.

has also been recently independently reported by Lerman *et al.* (38). Electron microscopy of a typical human interstitial cell from such a nodule is shown in Figure 13. It is an irregularly shaped cell with a large prominent nucleus and a cytoplasm with large paranuclear cysterna. In addition, the human interstitial cell has many finger-like processes in close approximation with collection ducts and vasa rectae.

The function of this intriguing nodule is totally unknown. However, we do not believe it to be a "tumor" because of its limited size, constant location, lack of encapsulation and high content of prostaglandins (37). We prefer the term "renomedullary body" until such time as it can be determined if it is an abnormal finding (tumor) or a functional interstitial cell gland.

In the course of time it became evident that it would be necessary to evaluate the effects of PGA_2 in patients with human hypertension to observe if it exerted similar hemodynamic effects as in the animal. In 1965, Prostaglandin A_2 (medullin) was first administered intravenously into a 25-year-old female with fixed diastolic hypertension (19). Figure 14 shows that the patient's control blood pressure was 185/115 mm Hg and that it fell to 165/95 mm Hg at a PGA infusion rate of 382 μg/min. As in the animal studies the fall in blood pressure was the result of a decrease in peripheral resistance secondary to peripheral arteriolar dilation. Again the rise in cardiac output could be accounted for almost entirely by an elevation in heart rate. During the study the patient complained of no side effects such as headache, flushing, abdominal cramps, etc., previously noted for PGE_1 given to normotensive humans (39). However, she did have an intense urge to void and experienced a large diuresis the significance of which was not appreciated at the time.

Further studies with PGA_2 in human essential hypertension were not done because the supply of this compound isolated as medullin from the kidney was exhausted. However, PGA_1 obtained by dehydration of PGE_1 biosynthesized from linolenic acid became available for clinical trials (40). At the present time, PGA_1 is believed to contain identical properties of PGA_2, although differences between the two compounds may

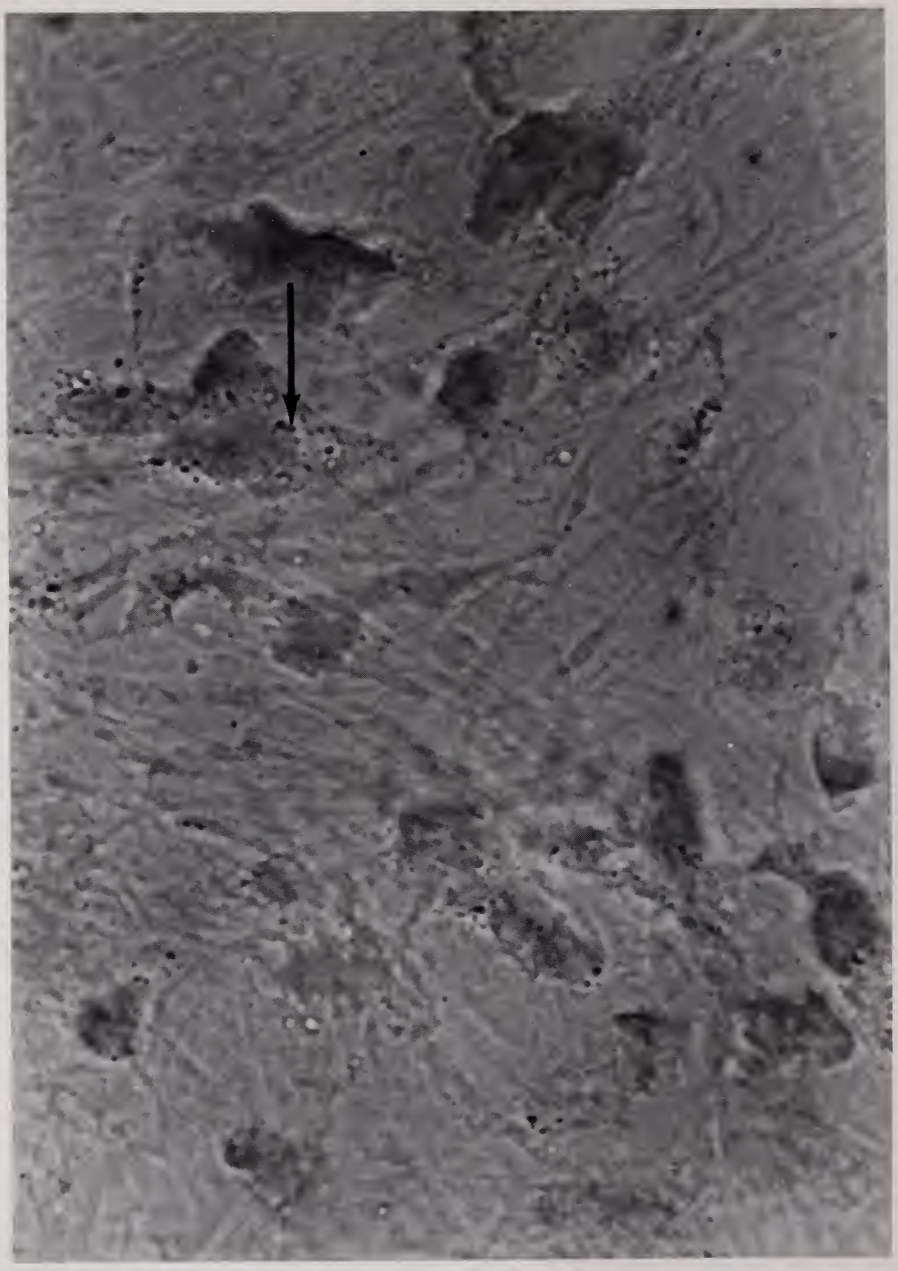

Fig. 12. Interstitial cells containing lipid droplets (arrow) from renomedullary nodule shown in Figure 11. X 1000. Reproduced from (37) with permisssion of the publisher.

emerge with further investigation. Figure 15 shows the effects of PGA_1 given intravenously on blood pressure in six of the total group of 20 patients with essential hypertension so far studied (41-43). Control blood pressure was 200/110 mm Hg. During Period I, when PGA_1 was infused at 1 μg/min, there was no initial effect on blood pressure; during Period II, there was a fall in blood pressure to 140/85 mm Hg. The fall in blood pressure was again the result of

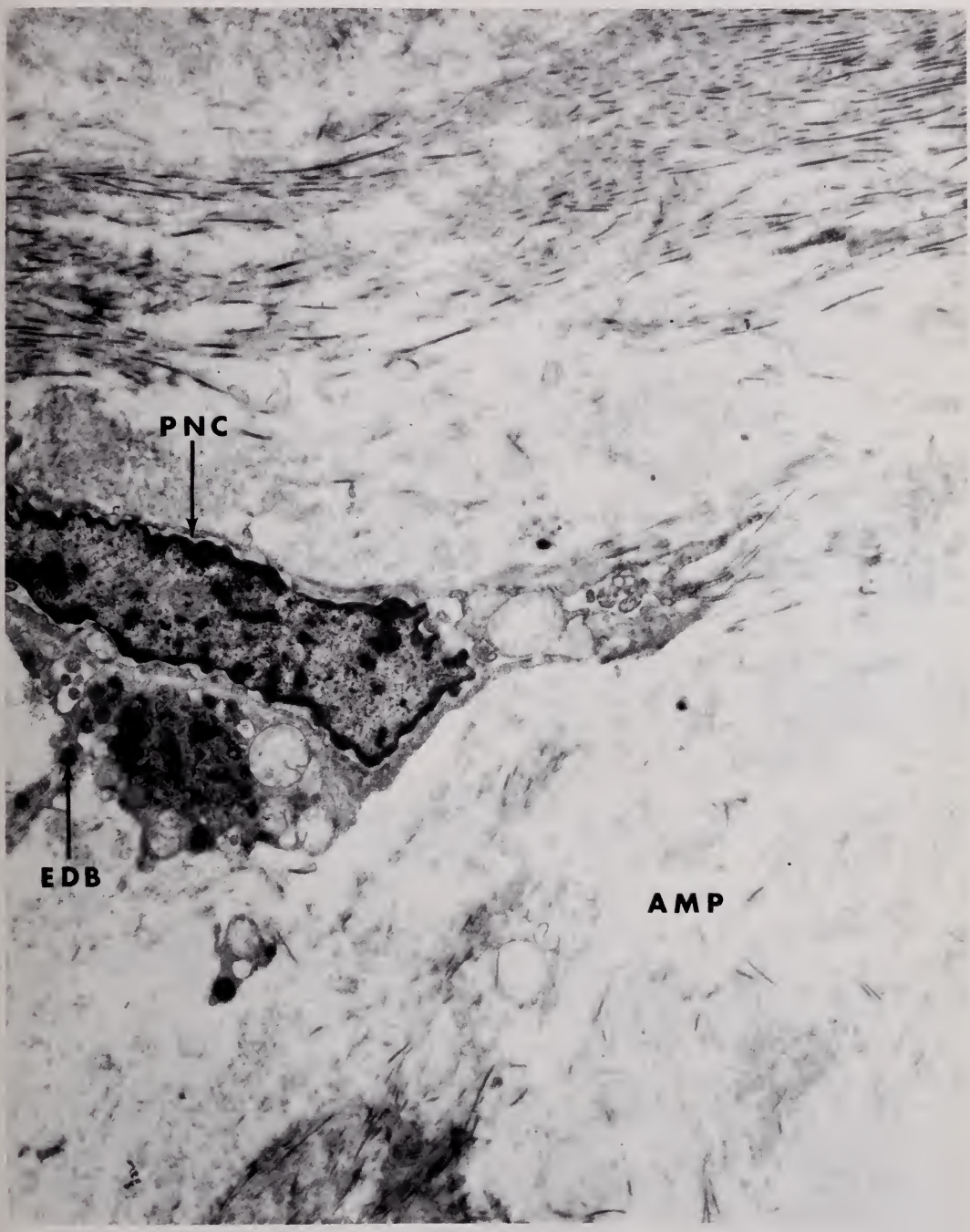

Fig. 13. Electron microscopic detail of a typical human interstitial cell. Note prominent paranuclear cysterna (PNC), and electron dense bodies (EDB) representing fat droplets in the pseudopod processes. There is a surrounding matrix of acidic mucopolysaccharide (AMP). X 6880. Reproduced from (37) with permission of the publisher.

peripheral arteriolar dilation (Table III). During Period I, while the patients were hypertensive, there was an almost immediate rise in renal blood flow (Figure 16) which fell to control when blood pressure was normalized in Period II. The rise in renal blood flow was accompanied by an elevation in the glomerular filtration rate which, however, was of less magnitude than the rise in blood flow, so that the filtration fraction fell significantly.

Accompanying the rise in renal blood flow and glomerular filtration was an increase in urinary flow which was the result of a marked natriuresis (Figure 17). The rise in urinary sodium excretion in some patients was as high as 2,500 μEq/min., while in others a more modest natriuresis occurred. However, urinary sodium and urinary flow fell to control levels when blood pressure was lowered during Period II. This pattern of an initial increase and a subsequent fall in control was also observed with urinary potassium excretion. From these results it would appear that the first effect of PGA_1 is to dilate the renal vascular bed, which is, as has been mentioned, the most sensitive of all vascular beds to the vasodilating action of this compound. When renal dilation occurs, the elevated blood pressure leads to an increase in renal blood flow and natriuresis. The natriuresis is probably the result of an increase in peritubular hydrostatic pressure which has been shown by a number of investigators to produce inhibition of sodium reabsorption by the renal tubule. However, during Period II, it is presumed that there is extrarenal vasodilation leading to a fall in blood pressure and a lowering of renal perfusion pressure which is associated with a return of the initially elevated renal blood flow and sodium and water excretion to control values.

We believe that the intimate participation of the renal vascular with the blood pressure lowering effects of prostaglandin A may have important physiologic as well as pharmacological implications. Most agents which lower blood pressure, with the notable exception of

TABLE III
Effect of Prostaglandin A_1 on Cardiovascular Hemodynamics in Patients with Essential Hypertension*

	PGA_1					
	Control Period	P	Period I (1 μg/kg/min)	P†	Period II (2 μg/kg/min)	P‡
Blood pressure (mm Hg)	202/112 ± 6/4	N.S.	187/102 ± 6/5	<0.025/N.S.	164/96 ± 6/4	<0.001/<0.025
Heart rate (beats/min)	72 ± 2	<0.001	87 2	<0.01	96 3	<0.001
Cardiac index (L/min/m²)	2.85 ± 0.36	N.S.	4.03 0.68	N.S.	3.59 0.68	N.S.
Peripheral resistance (Wood units)	38.4 5.0	<0.025	22.6 3.0	N.S.	22.0 2.7	<0.01

* Each value is the mean ± SE of 12 to 18 observations during each period in six hypertensive patients. Control period: 15 minutes (three successive five-minute intervals). Period I and period II: 15 minutes (three successive five-minute intervals during infusion of PGA_1 [1 and 2 μg/kg/min, respectively]). P = probability difference between control period and period I; P†, between periods I and II; P‡, between control period and period II. N.S. = not significant.

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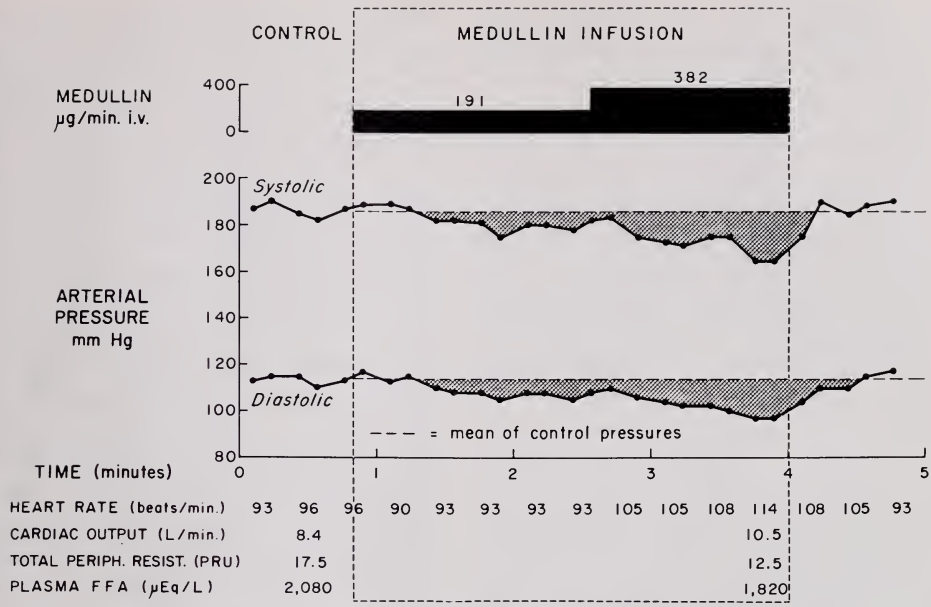

Fig. 14. The effect of medullin (PGA_2) infusion in a patient with fixed diastolic essential hypertension. There is a fall in blood pressure from approximately 190/115 to 165/100. The fall in blood pressure was the result of a decrease in total peripheral resistance with the secondary rise in cardiac output due to baroreceptor mediating increase in heart rate. Reproduced from (19) with permission of the publisher.

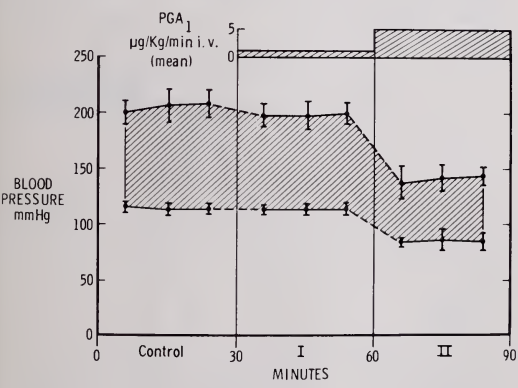

Fig. 15. The effect of PGA_1 on blood pressure in six patients with fixed diastolic essential hypertension. During the initial infusion at 1 μg/kg/min. there was no change in systemic blood pressure (Period I); however, when the infusion rate was increased to 5 μg/kg/min. there was a significant fall in blood pressure from 200/115 to 145/85 mm Hg. Reproduced from (43) with permission of the publisher.

hydralazine, result in a decreased renal blood flow. When renal function is compromised by disease, there is further deterioration of renal function with many hypertensive agents, often necessitating their withdrawal. However, this does not appear to be true for the naturally occurring prostaglandins which eventually result in the production of normotension associated with a normal renal blood flow and a normal sodium excretion.

The mechanisms by which PGA alters renal function leading ultimately to a fall in blood pressure appears to be highly complex. In an attempt to unravel some of this complexity and taking into consideration all the known facts regarding the cardiovascular renal actions of PGA_1, we have entertained a hypothesis (44) which is shown in Figure 18.

Behavioral stimuli (intellectual activity, sudden fright, etc.) are known to produce a rise in blood pressure in normotensive individuals by increased sympathetic activity leading to norepinephrine release and also possibly activation of the angiotension mechanisms. This increase in blood pressure is associ-

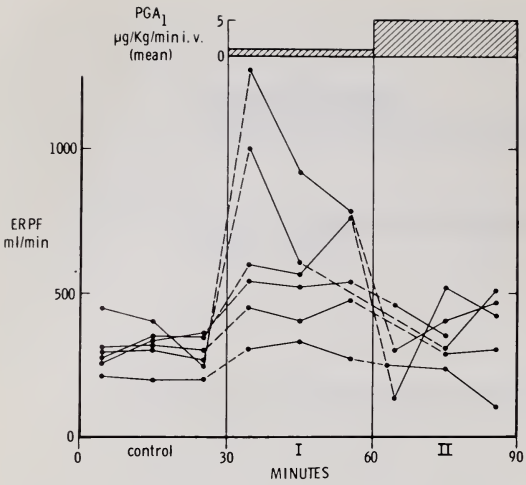

Fig. 16. The effect of PGA_1 on renal plasma flow in patients with essential hypertension. During Period I when there was no effect of PGA_1 on systemic blood pressure there was a modest to marked rise in renal plasma flow which progressively fell toward control value reaching the latter when blood pressure fell to normotensive levels during Period II. Reproduced from (43) with permission of the publisher.

ated with intrarenal cortical vasoconstriction, so that, despite the elevation in systemic blood pressure, blood flow to the renal cortex remains unchanged. This represents the so-called autoregulatory function of the renal cortex. In contrast, it is not believed that the renal medulla in most species autoregulates as does the renal cortex, but that an increase in blood pressure is associated with an elevation in renal medullary flow. This might result in a release of PGA_2 or PGE_2 by the interstitial cells which are in close approximation to the renomedullary vascular tree. Experimental evidence for such a release of prostaglandins was obtained by Muehrcke (45) and Tobian (46), who observed a depletion of the osmiophilic granules of such cells in various states of experimental hypertension.

If PGA_2 or PGE_2 are released by such a mechanism, they may circulate intrarenally to the inner regions of the cortex and produce their characteristic effects, i.e., renal vasodilation. Although the mechanism of such renal vasodilation is unknown, it is proposed that the PGA and/or PGE compound directly offsets norepinephrine or angiotension mediated cortical arteriolar vasoconstriction. This would lead to an increase in renal blood flow which, as has been noted, results in a fall in arteriolar blood pressure both by a decrease in plasma volume as well as by a fall in peripheral resistance. In essence, normotension would occur associated with a normal renal blood flow and normal sodium excretion. In this fashion, the increased renal sympathetic activity or angiotension vasoconstriction action would be countered by the intrarenal medullary prostaglandins without the necessity of these compounds entering into the circulation. However, although PGE could not produce renal vasodilation by systemic means, it is quite possible that PGA might be re-

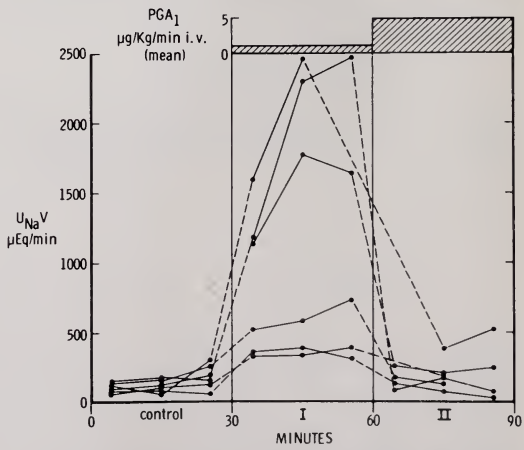

Fig. 17. Effect of PGA_1 on sodium excretion in patients with essential hypertension. Note the identical pattern as with renal plasma flow in that there was a rise in the excretion of sodium to as high as 2500 mEq/min. During Period I blood pressure remained elevated. Again during Period II when blood pressure fell there was a return of the elevated sodium excretion to control levels. Reproduced from (43) with permission of the publisher.

leased into the renal blood and circulated via the pulmonary tree to return to the renal cortex and lead to cortical vasodilation and the antihypertensive and natriuretic effects previously mentioned.

If in the last analysis essential hypertension may be the result, at least in part, of a deficiency of renomedullary PGA_2 and PGE_2, there are at least two mechanisms whereby such a deficiency could lead to sustained elevation in blood pressure. The most simple concept would be that PGA is released from the renal medulla in response to an appropriate stress and circulate systemically to dilate extrarenal vessels. A systemic deficiency of PGA synthesis within the renal medulla could thus lead to arterial hypertension by a decrease in circulating PGA. This would lead to an increase in total peripheral resistance by vasopressor mechanisms acting unopposed. If this mechanism is operating in some patients with hypertension, the plasma concentration of PGA, measured by radioimmunoassay or mass spectroscopy, would be expected to be significantly lower than that of normotensive subjects. Preliminary measurements of PGA in patients with essential hypertension suggests that this, at least in some instances, may be the case. Attallah, Vance and Elwood in our laboratories (47) have shown in normotensives PGA concentration measured by radioimmunoassay to be between 1.2 and 2.4 pg/ml (Figure 19). Interestingly, there was a marked dependence on sodium intake as judged from 24-hour urinary sodium values immediately before assay. At sodium values below 100 mEq/24 hours, there was an increase in PGA to between 2.5 and 4.0 pg/ml. One group of females who spontaneously ingested less than 75 mEq/24 hours displayed significantly higher PGA levels than corresponding males on a very high intake (<250

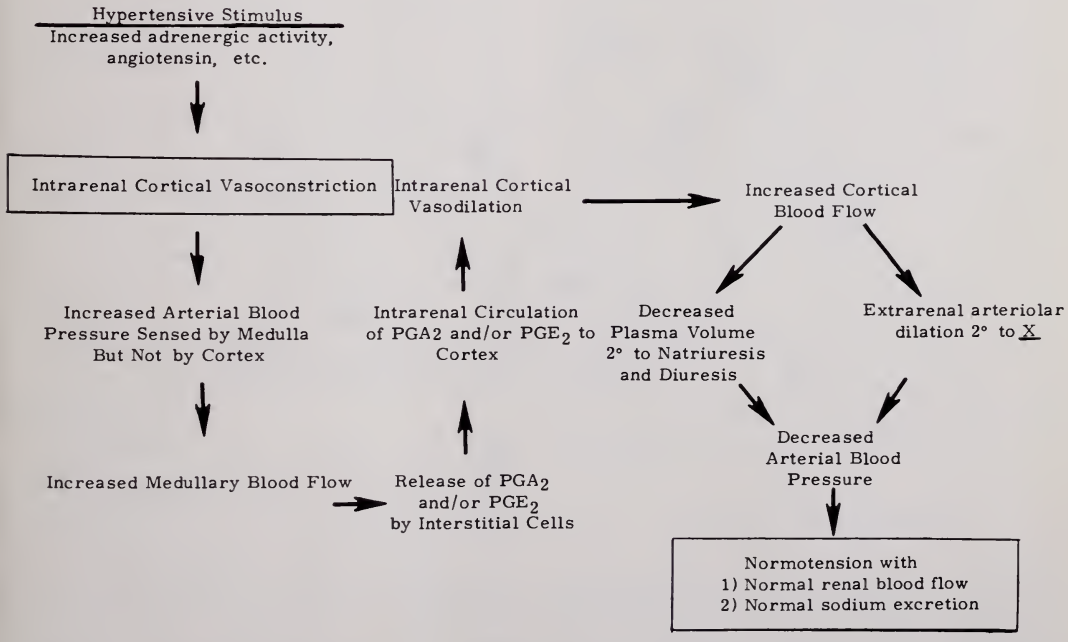

Fig. 18. Schematic representation for the possible intrarenal role of the renomedullary prostaglandins in the regulation of systemic blood pressure, and maintenance of normotension. Reproduced from (18) with permission of the publisher.

mEq/24 hours). Interestingly, this group of females had a significantly lower blood pressure (100/70) than the corresponding males (125/85). Similar values for PGA and its dependence on sodium have been independently reported by Zusman *et al.* (48).

As would be expected, renin concentration increases secondary to the volume depletion associated with restricted sodium intake (48). This suggests that increased renin and angiotensin may in some fashion release renal prostaglandins, an observation documented in experimental animals (49). In effect, the beneficial effects of a low sodium diet (or diuretics) on blood pressure in the early phases of essential hypertension may be the result of increased PGA rather than solely volume depletion.

In a group of eleven patients with

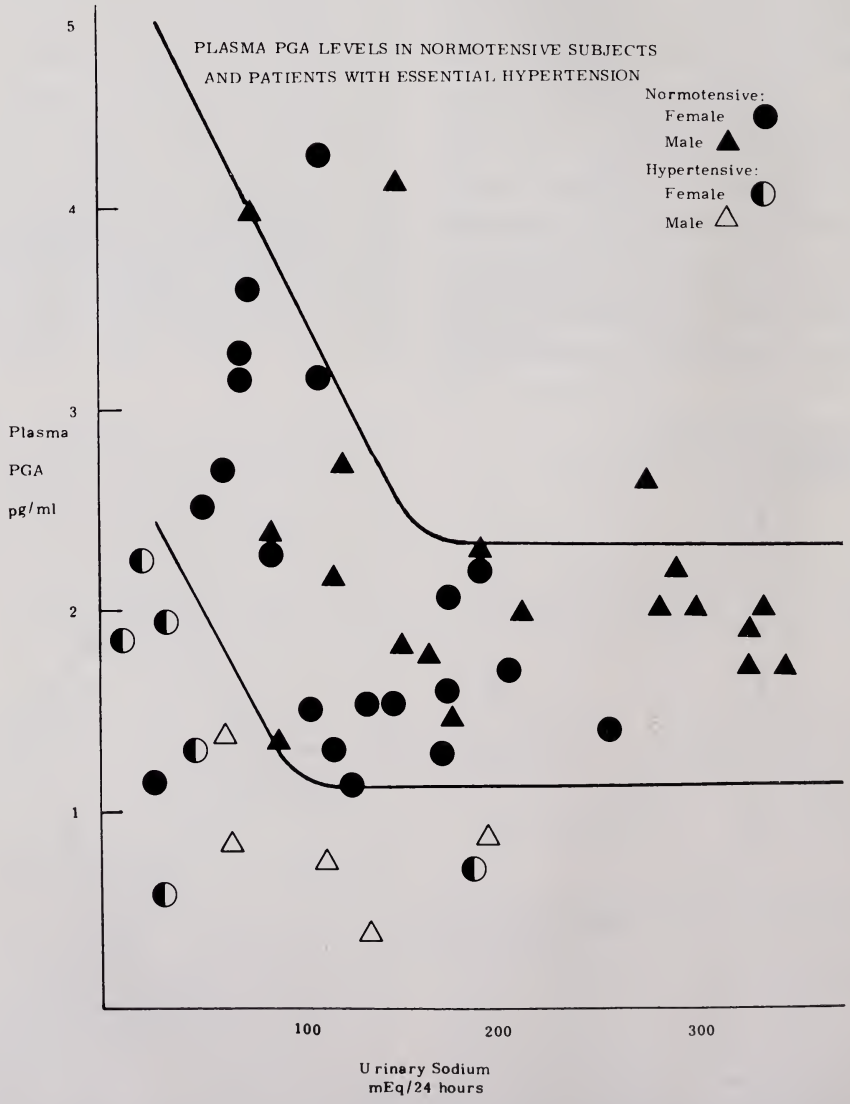

Fig. 19. Peripheral plasma concentrations of PGA in normotensive subjects and patients with essential hypertension. Reproduced from (47) with permission of the publisher.

essential hypertension, peripheral venous PGA was significantly lower at all sodium excretion rates than corresponding normotensives (Figure 19). This suggests that a systemic deficiency of PGA may be operative, at least in some patients, in the etiology of essential hypertension. However many additional and critical studies are needed on age-sex matched individuals, during acute volume expansion and on the state of hypertension (acute vs. labile, low renin vs. normal or high renin) before any such conclusion can be reached.

An alternative mechanism which does not involve elaboration of the renal prostaglandins into the systemic circulation is indicated in Figure 20 (50). If the normal role of PGA_2 and PGE_2 is to promote cortical vasodilation and redistribute blood flow from medulla to cortex, an acquired or hereditary deficiency of either or both of these compounds may be expected to result in the reverse: that is, intrarenal vasoconstriction. In this light it is interesting to know that Bradley *et al.* (51) and Gomez (52) demonstrated that one of the earliest abnormalities in patients with essential hypertension is intrarenal vasoconstriction. In effect, such "functional" intrarenal vasoconstriction might lead to the production of sustained hypertension by the same mechanisms (renin-angiotensin) which underlie the vasoconstriction following large vessel abnormality (partial occlusion of the renal artery) or small vessel disease (renal arteriolar nephrosclerosis.)

In summary, an attempt has been made to integrate the known facts of the renomedullary prostaglandins with mechanisms believed to be operative in the production of renovascular and human essential hypertension. Although it is far too premature to draw any conclusions regarding a possible role for the renal prostaglandins in essential hypertension, it has to be conceded that

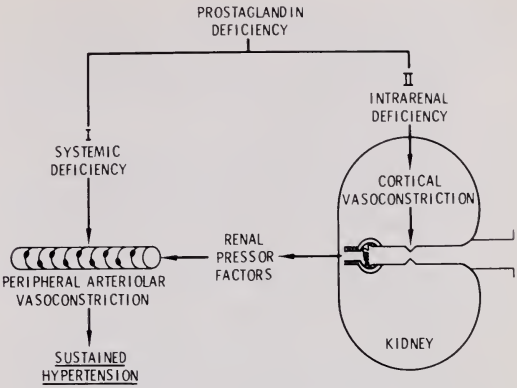

Fig. 20. Schematic representation whereby a systemic deficiency (I) of PGA may lead to the production of sustained hypertension. In contrast in an intrarenal deficiency (II), circulating prostaglandins would not be necessary in order to produce intrarenal vasocortical constriction leading to peripheral arterial vasoconstriction and sustained hypertension. Reproduced from Lee, J. B.: Antihypertensive activity of the kidney—the renomedullary prostaglandins. New Eng. J. Med. *277:* 1073, 1967.

these compounds in fact do represent "ideal" antihypertensive agents in that they produce their effects by reverting many of the cardiovascular-renal abnormalities which are existent in patients with essential hypertension. Thus they favorably affect renal resistance, total peripheral resistance, sodium balance, extracellular fluid volume and indirectly cardiac output, leading to a lowering of arteriolar blood pressure. All these factors have been shown to be involved in some way in the production of experimental and human hypertension. Much further additional work remains, however, before the prostaglandins can be accepted as having true antihypertensive and natriuretic functions.

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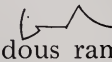
Medical Phonography: The Story of Shorthand in Medicine[1]

By LAWRENCE CHARLES PARISH, M.D.[2]
AND THOMAS N. HAVILAND, M.A. (HON.)[3]

No, the title is not a misspelling for an X-rated paper, nor is this the annual report for the record division of the Music Corporation of America. In fact, medical phonography is about a reputable medical journal, written entirely in shorthand and entitled *The Phonographic Record of Clinical Teaching and Medical Science.* It flourished from 1894 until 1911.

Phonography can be defined as a type of shorthand in which a sound is recorded by a distinctive character. Terms used interchangeably with phonography are stenography (little writing), tachygraphy (swift writing) and brachygraphy (short writing).

Shorthand has been used for some 2,500 years. Cicero's speeches were recorded in shorthand on wax tablets in the Roman Senate in 633 B.C. (1) by Marcus Tiro, inventor of a shorthand method. The Tironian method was often used by the early Christian Church to record exactly the comments of its leaders. Thomas à Becket, Archbishop of Canterbury, promoted the use of shorthand in the eleventh century, and Samuel Pepys employed the zeiglographic system of Thomas Shelton in his famous diary (2).

Phonetic shorthand had its start in England in the eighteenth century, but it was not popularized until Sir Isaac Pitman published *Stenographic Sound Hand* in 1837 (3). He was a schoolmaster who wanted his pupils to spell phonetically. As a result, he introduced a simpler method for recording the sounds of the English language with abbreviations and substitution of symbols for letters, i.e. phonography  . This was to have tremendous ramifications during the next several decades. Pitman sent his brothers to North America and to Australia to promote his system. Incidentialy, he maintained that court records could be kept more accurately and business offices could function more efficiently, if the Pitman method were utilized.

Before shorthand could become practical, a useful writing utensil had to be developed. The first fountain pen that fullfilled the requirements was manufactured in 1884. Lewis E. Waterman in New York made the fountain pen an inexpensive and easily available item. Although the fountain pen patent had been obtained by Hyde from Reading, Pennsylvania, as early as 1830, his gadget could not be mass produced (4).

With Waterman's pen, students could now record lectures in shorthand. By the early 1890's, several physicians had converted to the Pitman cult (5):

> "Pitman phonetic shorthand or phonography. It is the system employed by 95% of shorthand writers," so a physician wrote to the British Medical Journal, "and by a still larger proportion of those members of the medical profession who use shorthand, and

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do so, among themselves, in professional correspondence. Those who have used shorthand extensively in professional work (Dr. Gowers for instance and Dr. Gray of Oxford) are strenuous in its advocacy."

By this point in time, several medical men were beginning to think of organizing a medical society devoted to the Pitman method.

In the *British Medical Journal* for 1894, three advocates stated (6):

"In order to promote the use of shorthand in medicine, it is desirable that a list should be compiled of all those who use it. We would, therefore, ask each practitioner and student who is acquainted with phonetic shorthand to send his name and address to Dr. Neil, Warneford Asylum, Oxford. A printed copy of the list will be sent to each one whose name appears on it."

This was signed by William Gowers, Edward Gray and James Neil. The letter also appeared in *The Lancet* (7) and *The Boston Medical and Surgical Journal* (8). Gowers, better known as a neurologist, described the funiculus anterolateralis superficialis and was the inventor of the hemoglobinometer.

The response to this letter did not appear to be overwhelming, but by the end of that year the first number of *The Phonographic Record of Clinical Teaching and Medical Science* appeared in London, being privately printed. This publication was entirely in Pitman except for the titles of the papers. Dr. James Taylor edited the journal until 1898, when Dr. Fred Spooner assumed the chiefship.

The subjects were widely varied and represented, for the most part, rewritings from other journals. A sampling of these offerings makes one wish he were more conversant with Pitman shorthand.

Volume 1. "Blinding by Electric Light." (Edison had been granted his patent only in 1880.) "Abdominal Sections in Private Practice."

2. "The Ophthalmoscope as Otoscope," by Gowers.
3. "Mirror Writing in Phonography."
4. "The Post-mortem Examination of King George II" and "Some Medical Word Histories."
5. "Enamelled Tinware as a Cause of Plumbism."
   "A Case of Spontaneous Evolution with a Living Child."
6. "Pitman's German Shorthand."
   "The Continental Method of Jumping to Conclusions."
   "The Public Vaccinator" - - - - - SUNG!!!! at the Annual Dinner of the Bolton Poor Law Officer's Association, February 20, 1900.
7. "Adolphus Willoughby Jones, M.D., Club Doctor," a ballad!
   "Motor Cars." "Hereditary Gallstones."
8. "Concentration Camp." "Ugly—a Hospital Dog."
9. "The Bicycle and Medical Practice."
13. "Under the Gallows—An Old Phonographer's Recollections."
14. "Reactive Hygienic Values of Gas and Electric Lighting."
    "Arsenical Wall Papers." "The Dying Bacillus," a poem.
    "A Centenarian's Last Regrets."

The Library of The College of Physicians of Philadelphia apparently has the largest run of the Journal in America which includes all but the last three volumes, Volume 15 having not been located in the United States, and Volume 16 and 17 being found at the New York Public Library. Recently, the National Library of Medicine microfilmed all available volumes.

Medical phonography was more than a journal. In fact, it approached becoming a powerful organization.

By 1895, the Society of Medical Phonography had 144 members. Among them were Sir John Pringle, Gowers, and even five American physicians. Curiously, William Osler, who was usually in the forefront of any movement to advance medical science and who donated the Journal to The College of Physicians of Philadelphia, is not listed

among its members, although he contributed several articles to its columns.

The Society offered prizes to students with the best proficiency in the Pitman method. In addition, shorthand could account for 5% of the General Medical Council qualifying examination in Great Britain.

The Society also undertook several other projects. Early in the Journal, they advertised for students with shorthand ability to assist medical people (9):

> "There is reason to believe that many physicians and surgeons would be glad to obtain the help (for lectures and other work), of senior students, who have competent shorthand ability. Dr. Neil will be glad to receive the names and addresses of such, who can write 100 words a minute and upwards (with the actual speed in each case), and will, if the number is adequate, take measures to make known the fact that such help is available."

Over the next few years, the Society was able to publish at least seven books.

1. *The Phonographic Record of Clinical Teaching and Medical Science.*
2. *The Use of Shorthand by the Student.*
3. *The Use of Shorthand by the Practitioner.*
4. *Phonographic Outline of Medical Terms, with an Appendix.*
5. *Diagnosis of the Nature of Organic Brain Disease*, by W. R. Gowers.
6. *The Work of the Life Assurance Examiner*, by W. R. Gowers.
7. *Some Diseases of the Rectum and Anus*, by William Thomson.

During the 1890s and first decade of our century, both the Society and the Journal flourished. Then interest faded. Mysteriously, the Journal stopped publication with Volume 17 in 1911. We say "mysteriously" because we have been unable to locate any reference, reason or record to date for the demise of the Journal.

In retrospect, medical phonography was a logical and interesting experiment. It could, in some instances, have merit even today. The comments of three generations ago could apply today:

> "The chief claim is that when written at three times the speed of longhand, phonetic shorthand has a greater average legibility not only to the writer, after any lapse of time, but to another person. This is only alleged of Pitman's system, in which alone experience has been gained, and which is now used, it is said, by 90 per cent of all writers."

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On the Health of Charles Darwin[1]

By NICHOLAS PADIS, M.D.[2]

A few years ago I presented a paper to this section under the title, "Darwin's Prolegomena to Psychosomatic Medicine." In that paper the statement was made that both in the history of psychosomatic medicine and in the works of Darwin his illness was mentioned time and time again.

The main thought in the presentation of "Darwin's Prolegomena To Psychosomatic Medicine" was that Darwin's contribution to psychosomatic medicine was based primarily on his book, *The Expression of the Emotions in Man and Animals.* It seems unfair that his *Origin of Species* received considerable attention in 1959, a century after it first appeared, but that *The Expression of the Emotions in Man and Animals* on its 100th anniversary in November, 1972, received no recognition whatsoever.

Sir Gavin Debeer, however, in his *Charles Darwin* published in 1964, concludes that *The Expression of the Emotions in Man and Animals* completed Darwin's theories on evolution. If the *Origin of Species* and *The Descent of Man* established anthropology as a science, *The Expression of the Emotions* laid the foundation of ethology, the study of non-verbal motions, communication habits, and traditions in men and animals. According to Darwin's autobiography, *The Origin of Species* and *The Descent of Man* were but the prelude to *The Expression of the Emotions in Man and Animals,* which in reality is the history of the descent of human emotions. The book is a classic achievement in the observation and description of mannerism, habit, tradition and behavior in man and animals.

Another far-reaching effect of this book is that it introduced Freud to the study of medicine and to Darwin's other theories. Freud is sometimes called "The Darwin of the Mind"; but, if Freud is the "psychoanalyst," Darwin is the "bioanalyst."

Both men shared certain basic concepts. Both adopted in their philosophies the Shakespearean epigram, "What's past is prologue," and both were misunderstood and are misunderstood to this day. And this verifies the Emersonian dictum, "To be great is to be misunderstood."

Darwin's theories also influenced the psychophysiological concepts of Pavlov. According to his biography, it was *The Expression of Emotions in Man and Animals* that inspired him to transfer psychic phenomena from the chambers of philosophy to those of physiology.

The diagnosis of Darwin's illness, however, continues to be a medical riddle. In his autobiography, Darwin complains repeatedly of fatigue, palpitations and inability to carry on. He seems to be trying to convince himself that he has a weak heart. But the wonder lies not in his illness, but in his amazing accomplishments under the pressure of that illness which lasted forty years.

The chapter of reminiscenses related by his son, Francis, reveals Darwin's life in detail. There one sees that his work and its complexities generated the pri-

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mary stress affecting his life. One gets the impression that the skies of his health were always cloudy but never stormy, and that the sun of health appeared and disappeared according to the anxieties of each day.

The vast literature on Darwin deals extensively with his theories and his works but has comparatively little to say about his illness or the state of his health. When his illness is described, an array of symptoms are given but never a diagnosis by a physician or any specific treatment. What treatment he may have had is left to guesswork and to our incomplete knowledge of what the doctors of his time prescribed for such symptoms.

But the more one studies Darwin's symptomatology, the more one is inclined to call his illness a syndrome, rather than a distinct disease. The papers published on this subject virtually cover the history of medical progress, from his death in 1882 to the present day. They suggest the conclusion that Darwin was a paradoxical medical phenomenon, a healthy-sick man, living in a day when the average span of life was not over forty. According to various authors, he suffered from many "diseases." He had symptoms of arthritis, baldness, gout, boils, circulatory and cardiac problems, various dermatoses, periodic fever, headaches, epilepsy, narcolepsy, hyperinsulinism, dental problems, tremors, depressions, dyspepsia, hypoglycemia and hypochondriasis.

At the beginning of the century, psychogenic and psychiatric diagnoses of Darwin's illness predominated. It was normal to try to fit his life into the psychiatric concepts current at that time. From the standpoint of internal medicine, however, it is difficult to agree that all those psychosomatic manifestations were primarily expressions of Darwin's subconscious.

One psychiatric explanation of his illness disclosed that because he could not kill his father on earth, he killed his "Father" in heaven by writing *The Origin of Species*, *The Descent of Man* and *The Expression of the Emotions in Man and Animals*, and that he suffered the remorse of the Oedipus complex for the rest of his life.

Of course, no one can rule out all psychosomatic manifestations in Darwin's health, considering his heredity and environment and the great stress he experienced during his forty years of creative life. One wonders, however, about the motives of those who tried to explain the illness psychiatrically. Was this an attempt to counteract his theories of evolution by presenting him as mentally ill? As time went on, psychogenic causes became part of the equation of his illness, but not the whole of it. By now there have been multiple attempts at a diagnosis based on organic or metabolic conditions.

A few years ago, Adler wrote a paper in which he argued that Darwin suffered from Chagas Disease, a parasitic infection, contracted while he was investigating the Patagonian plants of Argentina. However, Woodruff, after intensive study, concluded that the damage caused by this disease is incompatible with Darwin's other symptoms and especially with a long creative life. Nothing in the Beagle's log indicates that anyone on board had contracted Chagas Disease.

Much more recently, John H. Winslow published a paper under the title, "Darwin's Victorian Malady: Evidence for Its Medically Induced Origin." In this excellent monograph, Winslow concludes that Darwin's illness was due primarily to chronic arsenical intoxication. However, although he presents a series of functional, organic and psychosomatic symptoms due to chronic arsenical poisoning or "Fowler's Disease," such

symptoms are common to many other syndromes. Moreover, arsenic poisoning of the heart is rare. If it occurs, it is the end result of the poisoning of other organs, especially the liver and the kidneys. Medical therapy in the middle of the nineteenth century relied on herbs and metals and various other means, most of which reveal the frustrated therapeutic paths followed in the practice of medicine at that time. According to Winslow, not only Darwin suffered from this Victorian malady, but also many of his great contemporaries in the arts, sciences and letters. All were undergoing the same treatment by the same doctors, who used arsenic as the wonder drug of their day. It appears that arsenic poisoning was an endemic disease at that time.

Another metabolic effect of chronic arsenical intoxication is that arsenic counteracts thyroxine and that its chronic use creates a state of hypothyroidism. Many of the functional and metabolic disorders listed by Winslow, such as hypoglycemia, palpitation, P.A.T.'s, reactive hypoglycemia, loss of hair, dermatoses, narcolepsy, headaches, G.I. upsets, allergic reactions to alcohol, inability to digest starches and carbohydrates and a craving for sweets are rather common in hypothyroidism. So the probability exists that Darwin may have suffered even in his youth from a mild hypothyroidism aggravated by the use of arsenic. Thus, arsenical intoxication becomes another factor in the equation of his illness but does not provide the complete answer.

It is difficult, then, to arrive at any definite diagnosis of Darwin's illness, and the truth may never be known, because the basic medical data are not available.

Looking at the whole of Darwin's life, one asks whether the man was really sick or whether he merely suffered the physical and mental variations in his health produced by stress. A sick man who suffered all his life from these multiple syndromes could hardly travel as widely and labor as hard as Darwin did and by his accurate observations bring into focus the biological concepts that resurrected the human spirit from the myths of the past. Clearly his so-called illness involved nothing more than variations in his fundamentally good health. As Winslow states, "Darwin was capable of mature love and of meeting the responsibilities of fatherhood, of making long-standing friendships, and of being generous with his time and money. All these qualities indicate emotional maturity which is incompatible with a psychoneurotic personality." Darwin's life is an example of the old Greek dictum that a healthy mind belongs to a healthy body.

But what is health? It is basically the product of three biological forces: heredity, physical environment and social environment. Health is a dynamic process expressing the will to live and not merely exist. Health has worn a halo of divinity since man first became aware of disease and death.

"We talk in generalities, but we live in detail," said Whitehead. It is so with health. Health as a concept is not easy to define. To many it continues to mean the absence of disease, but this is a negative definition. Today, besides individual health, we talk about world health, public health, industrial and community health. But individual health is not simply a state of being, but rather a direct force. Individual health is a totality, a goal, not a mere static condition, but a dynamic creative force.

One can go further and define a healthy person as a creative person, no matter what the condition of his separate organs might be. Creativity may beget pain and suffering, but only as an expression of total health, and total

health reflects the functional state of an individual's anatomical, physiological, biochemical and psychological systems, regardless of age.

A fascinating point about Darwin is that the last ten years of his life were the healthiest. In this period, he continued to be creative. He also walked more and seemed able to take unlimited exercise, according to his physicians. But by this time, the stress and the thunder and the storms that his theories created were subsiding.

The structure of Darwin's personality seems to be that of a valetudinarian, with major and minor episodic spells of a syndrome resembling a type of neuro-circulatory asthenia, brought on by the events and anxieties of his creative years. This asthenia is considered hereditary. As one of his grandchildren said, "Ill health was considered normal in the Darwin household." This asthenia was probably part of a subconscious mechanism that protected his rare genius from his complex social environment.

In summary, the state of Darwin's health was anthropogenic. Like any living man, he experienced variations in his mental and physical functions under hereditary and environmental stresses. It comes as no surprise to learn that as his life was drawing to a close, he said, "I am not in the least afraid to die." Judging from the description of his final symptoms, he died of circulatory failure. It was April 19, 1882, and his age was 73.

In conclusion, Darwin lived a noble life dedicated to the love of truth and freedom. He cultivated the art of accurate observation, but above all, the art of all arts, the art of creative living and forward thinking.

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First Non-M.D. Fellow of The College of Physicians of Philadelphia

By KATHARINE R. STURGIS

Mark Whittier Allam, V.M.D., was born in Fernwood, Pennsylvania. The two happy circumstances of his middle name and the woodsy sound of his birthplace may be partly responsible for this remarkable man's happy disposition and optimistic turn of mind. Anyone who loves animals is a lovable person—understanding, as he must be, of those who cannot communicate with words.

A graduate of our public schools, he received his V.M.D. from the University of Pennsylvania in 1932 and, for the next 13 years, practiced general veterinarian medicine in Media, Pennsylvania. Dr. Allam audited a course in Surgical Laboratory at Penn's Graduate School of Medicine from 1936 to 1938. From 1943 to 1945, he was a part-time instructor in veterinary surgery at his alma mater; then Assistant Professor from 1945 to 1948; Associate Professor of Surgery from 1948 to 1951; and, finally, Professor and Chairman of the Department of Veterinary Surgery from 1951 to 1953. He became Dean in 1953, a post he still holds until he becomes Assistant Vice President for Health Affairs of the University of Pennsylvania as soon as a successor is found for the Deanship.

From 1946 to 1952, Dr. Allam was a member of the Harrison Department of Surgical Research at the University of Pennsylvania School of Medicine, where he worked on peripheral nerve regeneration under Drs. Frederick Lewey and Francis Grant.

Among Dr. Allam's other important current posts are Director of the Interdisciplinary Cancer Research Project and membership on the Board of Managers of Wistar Institute of Anatomy and Biology. He was chairman of the Board of Regents of the American College of Veterinary Surgeons from 1966 to 1967. He has been a member of the Executive Board of the American Veterinary Medical Association, the Board of the American Veterinary Medical Association Foundation, and of the Advisory Board of the Bureau of Medicine of the Food and Drug Administration.

Mark Allam is interested in people and in the community. He was president of the Board of Education of the Media Borough School District from 1941 to 1960.

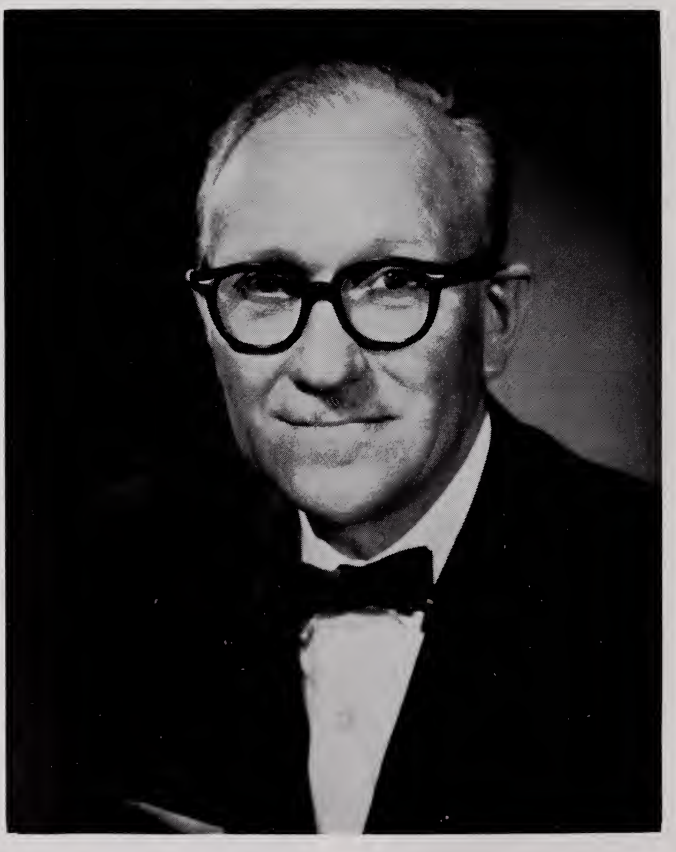
Dr. Allam has written numerous articles on veterinary medicine. He is the first non-M.D. ever to have become a Fellow of The College of Physicians of Philadelphia.

In the summer of 1972, when Mrs. Frank Elliott was planning the beautiful dinner tendered me at the College in October of that year, Dr. Allam 'phoned to invite the Elliotts and the Sturgis's to New Bolton Center to choose an equipage in which he would drive us from the Elliott home (the historic Reynolds-Morris House, on Eighth Street at Locust) to the College. We chose a landau in which the Empress Eugènie was said to have made her escape from Paris. Since she had to change carriages several times, it is likely that this was, indeed, an equipage in which the American dentist, Dr. Evans, for whom the University of Pennsylvania Evans Institute of Dentistry was named, drove the fascinating Empress on her escape.

Our choice having been made, Mark put a heavy leather apron on me so I could sit beside him in the sully with a fringe on top in which he drove the six of us over the New Bolton Center grounds to a country lane where we stopped and ate a fried chicken lunch. It was the hottest day I ever remember. Never before had I seen horses "in a lather". "What's wrong with Queenie and May?" I asked Mark. "They're in a lather," he replied—and jumped down and brushed off the copious, sudsy sweat with a great turkish towel he'd brought along for such a contingency.

October 20th came and Dr. Allam, in top hat, appeared at the Elliott's, reins in hand, coachman beside him, surgical resident-footman behind, and drove Maly and Jack Gibbon and Katharine and Sam Sturgis behind a police escort out Walnut Street and up 22nd Street to the College.

Full of fun—full of wisdom—Mark Allam! We salute him; we love him!



Mark Whittier Allam, 1908-.

Memoir of John W. Bransfield 1888–1973

By JONATHAN E. RHOADS, M.D.

John W. Bransfield, M.D., who was elected a member of The College of Physicians of Philadelphia in June 1921, died February 3, 1973, at the age of 85.

Dr. Bransfield was formerly chief of surgery at St. Agnes Hospital and served on the staff of St. Vincent's, Doctors and American Oncologic Hospitals. He was president of the Doctors Hospital in 1951-52 and was for a time medical director of the American Oncologic Hospital. He was professor of oral surgery at the Graduate School of Medicine of the University of Pennsylvania from 1945 until 1954, and was named emeritus professor.

Dr. Bransfield was born in Portland, Connecticut, in 1888 and attended Wesleyan College. He was graduated from the School of Medicine of the University of Pennsylvania in 1913.

For many years he was closely associated with the late Dr. George M. Dorrance and developed with him a reparative operation for cleft palate, contributing a number of papers to the surgical literature in this field. He was certified by the American Board of Surgery and the American Board of Plastic Surgery and was a member of the American Medical Association, the American College of Surgeons, the Academy of Surgeons of Philadelphia, and The College of Physicians. He was interested in athletics and was a member of the Racquet Club, the Philadelphia Country Club, and the Faculty Club of the University of Pennsylvania. During World War I, he served as a first lieutenant in the Army Medical Corps.

My strongest recollection of Dr. Bransfield was during an illness he had which required a subtotal gastrectomy. It was his wish that the operation be done in his home hospital, St. Agnes, but he was anxious that I. S. Ravdin perform it. Accordingly, Dr. Ravdin went to St. Agnes—I was his resident at the time—and we took a small team to St. Agnes and carried out the surgery. This was a good many days before the expressway was built and we commuted to St. Agnes via the "meadows," which was an open area of fields beginning a little bit south of Grays Ferry Road and extending to about 25th and Snyder Avenue. Daily visits to follow him postoperatively impressed me with his courage, his consideration for all who took care of him, and his intelligence and his warmth as a human being. He not only served many patients well, but contributed from his experience and inventiveness to the sum total of human knowledge. As is so often the case with those men who survive most of their contemporaries, it was not possible to present a contemporary point of view. We would be remiss, however, if we did not recognize Dr. John Bransfield as one of the very able persons carrying on the traditions of Philadelphia medicine and those of this College.

He is survived by his wife, the former Katherine Battle; a brother, Joseph; and three sisters, Helen, Mrs. Elizabeth Brown, and Mrs. Cecilia Keser.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of Chapin Carpenter 1890–1970

By WILLIAM C. FRAYER, M.D.

A fourth-generation Pennsylvania doctor, Chapin Carpenter was born on December 2, 1890, and died on May 11, 1970. He was a resident of Wayne, Pennsylvania, and practiced ophthalmology for 48 years in that community and in Philadelphia prior to his retirement in 1968. His major hospital affiliation was with the Bryn Mawr Hospital, where he was co-chief of the ophthalmology service from 1932 to 1954 and consulting ophthalmologist until his death.

Dr. Carpenter was a graduate of Trinity College and the University of Pennsylvania School of Medicine. He interned at Episcopal Hospital and afterward received his graduate training in ophthalmology under the preceptorship of his uncle, Dr. John T. Carpenter.

Following military service in World War I, he returned to Philadelphia to practice. He joined the staff of the Bryn Mawr Hospital and in 1924 was appointed to the faculty of the University of Pennsylvania School of Medicine, where he served until 1929 under the leadership of Dr. George E. de Schweinitz. He was a diplomate of the American Board of Ophthalmology and was a member of the American Medical Association, a fellow of the American Academy of Ophthalmology and Otolaryngology and of The College of Physicians of Philadelphia.

Chapin Carpenter was an "old-fashioned doctor" who was loved and respected by patients and colleagues alike. He took great interest in the personal lives of his patients and frequently visited them in their homes in times of trouble. His gentle humor often gave evidence of the warmth in his heart. He was not a spectacular man, but he will be remembered for his quiet dedication to his profession and to his family.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of Henry Underwood Hopkins 1900–73

By FRANCIS C. WOOD, M.D.

Henry Underwood Hopkins, M.D., died at the Hospital of the University of Pennsylvania on February 10, 1973, at the age of 72. He was born in Titusville, Pennsylvania, May 28, 1900, the son of Mary G. Underwood Hopkins and Henry D. Hopkins. He grew up in New Hartford, New York, was graduated from Hamilton College in Clinton, New York and later from the Medical School of the University of Pennsylvania in 1927. He interned at the Hospital of the University of Pennsylvania from 1927 to 1929. From that time on, he taught medicine in the School of Medicine of the University of Pennsylvania. His special field was diseases of the chest.

He was in charge of the medical ward teaching service from 1947 until 1964. He collected, edited, wrote and published the Hospital *Technique Book* for many years. He supervised the early editions of the *Hospital Formulary*. He organized, planned and taught the course in physical diagnoses for years and rewrote *Leopold's Physical Diagnoses* after Dr. Simon Leopold died.

He served as Major and later Lieutenant Colonel with the 20th General Hospital, the University of Pennsylvania Unit, in the Second World War in Assam, India, and was in charge of the ward for dangerously ill medical patients, first those with cerebral malaria and later those with scrub typhus.

He was a superb clinician and teacher, with all that implies. He did all the hard, fundamentally necessary, more or less invisible work for the Department of Medicine in the School of Medicine of the University of Pennsylvania from 1947 to 1964. He was a modest, unselfish, intelligent contributor. He has been one of the great, quiet, unostentatious builders of the School of Medicine and Hospital of the University of Pennsylvania for forty years.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Directory of Fellows of The College of Physicians of Philadelphia

(as of July 1, 1973)

Most of the following specialties of the Fellows of The College of Physicians of Philadelphia have been noted as listed in "Dorland's" or they have been obtained from other College records.

This is the first time such a list has appeared in *Transactions & Studies* and we will appreciate any correction or amendment.

SCIENTIFIC-MEDICAL SPECIALTIES KEY

A	Allergy
Adm	Administration
ALR	Otolaryngology
ANAT	Anatomy
ANES	Anesthesiology
ARTH	Arthritis
C	Cardiovascular Disease
ChiP	Child Psychiatry
D	Dermatology
DDS	Doctor Dental Surgery
DSc	Doctor Science
DVM	Doctor Veterinary Medicine
END	Endocrinology
ENT	Enterology
FP	Family Practice
G	Gynecology
GE	Gastroenterology
HEMA	Hematology
I	Internal Medicine
IND	Industrial Medicine
INS	Insurance Medicine
Med	Medical Education
Micro	Microbiology
N	Neurology
NEPH	Nephrology
NS	Neurological Surgery
NUC	Nuclear Medicine
OB	Obstetrics
OBG	Obstetrics & Gynecology
OM	Occupational Medicine
ONC	Oncology
OPH	Ophthalmology
OR	Orthopaedic Surgery
P	Psychiatry
PATH	Pathology
Pd	Pediatrics
PdA	Pediatric Allergy
PdC	Pediatric Cardiology
PH	Public Health
PhD	Doctor of Philosophy
PL	Plastic Surgery
PM	Physical Medicine & Rehabilitation
PN	Psychiatry & Neurology
PR	Proctology & Colon & Rectal Surgery
PrM	Preventive Medicine
PUL	Pulmonary Disease
R	Radiology
REH	Rehabilitation
RES	Research
RHEUM	Rheumatology
S	Surgery
TS	Thoracic Surgery
U	Urology

Resident Fellows

ELECTED		SPECIALTY
1967.	Abbiss, Joseph W., St. Francis Hospital, 8th & Dupont Sts., Wilmington, Del. (19805)	PATH
1972.	Abt, Donald A., 3800 Spruce St. (19104)	DVM
1972.	Aberdeen, Eoin, 1740 Bainbridge St. (19146)	Pd TS
1968.	Adams, Raymond E., #5 Split Rock Drive, Cherry Hill, N.J. (08034)	OPH
1961.	Adamson, William C., 1542 Susquehanna Rd., Rydal, Pa. (19046)	P Pd
1926.	Adler, Francis Heed, 8870 Towanda St. (19118)	OPH
1959.	Adlin, Albert, 1512 Lindley Ave. (19141)	I

1949. Aegerter, Ernest E., 3400 N. Broad St. (19140) ..... PATH
1953. Agerty, Horst A., 1230 Burmont Rd., Drexel Hill, Pa. (19026) ..... Pd
1964. Albert, Seymour M., 1305 W. Tabor Rd. (19141) ..... OR
1963. Albright, Edwin P., 805 E. Willow Grove Ave. (19118) ..... PR
1971. Alden, James C., Episcopal Hospital, Front and Lehigh Ave. (19125) I
1967. Alexander, Charles M., 930 W. Sproul Road, Springfield, Pa. (19064) ..... OPH
1958. Alexander, John Deaver, 590 E. Chestnut St., Coatesville, Pa. (19320) I
1972. Allam, Mark W., 3800 Spruce St. (19104) ..... DVM
1935. Alpers, Bernard J., 111 North 49th St. (19139) ..... N P
1960. Ames, Mary D., 290 St. James Place (19106) ..... Pd
1961. Amsterdam, Gerald H., 1201 W. Olney Ave. (19141) ..... S
1962. Annesley, William H., Jr., 39 Glendale Road, Upper Darby, Pa. (19082) ..... OPH
1961. Anthony, Russell A., 385 Lancaster Ave., Haverford, Pa. (19041) ..... P
1961. Aponte, Gonzalo E., 1025 Walnut St. (19107) ..... PATH
1930. *Appel, Kenneth E., 206 Glenn Rd., Ardmore, Pa. (19003) ..... P
1968. Apple, Stanley B., 333 West State St., Trenton, N.J. (08618) ..... S
1971. Ardizone, Rohlo A., 2109 Delancey Place (19103) ..... PL
1960. Arey, James B., 2600 N. Lawrence St. (19133) ..... PATH
1959. Arkless, Henry A., 2 Decker Sq., Suite IL22 Becker Blvd. & City Line, Bala-Cynwyd, Pa. (19004) ..... I C
1967. Armitage, Harry V., 225 E. 24th St., Chester, Pa. (19013) ..... S
1922. Arnett, John H., 2116 Pine St. (19103) I
1967. Aronson, Marvin E., 321 University Ave. (19104) ..... PATH
1952. Ash, Rachel, 326 S. 19th St. (19103) ..... Pd PdC
1952. Aston, Melville J., 6 Circle Drive, Margate, N.J. (08402) ..... U PH
1944. Atkins, Joseph P., 1201 Knox Rd., Wynnewood, Pa. (19096) ..... ALR
1956. Atkinson, John B., 624 Sussex Rd., Wynnewood, Pa. (19096) ..... I HEMA
1935. Atlee, John L., Jr., 822 Marietta Ave., Lancaster, Pa. (17603) ..... S
1952. Atlee, William A., 822 Marietta Ave., Lancaster, Pa. (17603) ..... S
1963. Austrian, Robert, Hospital of the University of Pennsylvania (19104) I
1958. Ayella, Alfred S., Jr., 1213 S. Broad St. (19147) ..... S
1973. Bachman, Leonard, 430 S. Fifth St. (19147) ..... ANES
1958. Baer, Samuel, 5123 N. Broad St. (19141) ..... I C
1952. Baier, Howard N., 3401 N. Broad St. (19140) I
1959. Baird, Henry Welles, III., 2600 N. Lawrence St. (19133) ..... Pd
1952. Baker, Howard W., 1333 Chestnut St. (19107) ..... Adm
1963. Baker, Richard B., 1851 E. Allegheny Ave. (19134) I
1967. Baker, Richard P., Jr., Misericordia Hospital (19143) ..... PATH
1946. Baker, Walter W., 315 Glenn Rd., Ardmore, Pa. (19003) ..... U
1963. *Balin, Howard, 1323 Medical Arts Bldg., 1601 Walnut St. (19102) ..... OBG
1957. Baltzell, William Hewson, 1530 Locust St. (19102) ..... ALR
1971. Bank, Arnold A., Albert Einstein Medical Center (Northern) (19141) ..... N
1969. Bannett, Aaron D., 1335–49 W. Tabor Rd. (19141) ..... S
1940. Barba, Philip S., 120 Erdenheim Road (19118) ..... Pd
1943. Barden, Robert P., 8835 Germantown Ave. (19118) ..... R
1939. *Barnshaw, Harold D., 526 Cooper St., Camden, N.J. (08102) ..... OPH
1957. *Barr, Stanley, 255 S. 17th St. (19103) ..... OBG
1939. Bartle, Harvey, Jr., Glenbrook Medical Bldg., 864 County Line Rd., Bryn Mawr, Pa. (19010) ..... P N
1972. Bartuska, Doris, 3300 Henry Ave. (19129) ..... ADM
1963. Bassett, James G., 3300 Henry Ave. (19129) ..... S INS
1971. Bassett, Samuel F., 501 Office Center Drive, Fort Washington, Pa. (19034) ..... INS
1932. *Batson, Oscar V., 3926 Pine St. (19104) ..... ALR
1921. Bauer, Edward L., Alden Park Manor (19144) ..... Pd
1933. Bauer, John T., 312 E. Second St., Moorestown, N.J. (08057) ..... PATH

* S. Weir Mitchell Associate.

1939. Baumann, Frieda, 200 N. Wynnewood Ave., Wynnewood, Pa. (19096) I
1973. Beavers, Ellington, 931 Coates Rd., Meadowbrook, Pa. (19046) .....Ph.D.
1971. Beck, William C., Jr., 510 Office Center Drive, Fort Washington, Pa. (19034) .....INS
1952. *Bedrossian, E. Howard, 4501 State Rd., Drexel Hill, Pa. (19026) .....OPH
1935. Beerman, Herman, 255 S. 17th St. (19103) .....D
1945. Behrend, Bernard, 5910 Green St. (19144) .....OM
1949. Beizer, Lawrence H., 419 South 19th St. (19146) .....I HEMA
1936. Bell, Benjamin Tertius, 1941 Woodland Rd., Abington, Pa. (19001) .....OR
1956. Beller, Martin Leonard, 1936 Spruce St. (19103) .....OR
1969. Belmont, Herman S., 245 N. Broad St. (19107) .....P ChiP
1956. Belmont, Owen, 5723 No. Park Ave. (19141) .....OPH
1959. Berk, Nathaniel G., 3-M Cedarbrook Hill Apts., Wyncote, Pa. (19095) .....I C
1973. Berkowitz, Henry D., 3400 Spruce St. (19104) .....S
1951. Bernstine, J. Bernard, Presidential Apts., City Line & Presidential Blvd. (19131) .....OBG
1965. Berry, Richard G., 1025 Walnut St. (19107) .....N PATH
1956. Berry, Theodore J., 164 Pennsylvania Ave., Bryn Mawr, Pa. (19010) .....GE
1967. Beyer, Karl H., Jr., Merck Sharp & Dohme Res. Labs., West Point, Pa., (19486) .....RES IND
1957. Biele, Albert M., 1530 Locust St. (19102) .....P N
1964. Biele, Flora H., 1103 Spruce St. (19107) .....NP
1918. Billings, Arthur E., 2020 Spruce St. (19103) .....S
1957. Birdsall, Thomas M., 3910 Powelton Ave. (19104) .....U
1933. Bishop, Paul A., The Dorchester, 226 W. Rittenhouse Sq. (19103) .....R
1970. Black, Herman M., Dept. Radiology, Graduate Hosp. (19146) .....NUC
1944. *Blady, John V., Parkway House, 2201 Benjamin Franklin Pkwy. (19130) ...S ONC
1970. Blain, Daniel, 2100 Clarkson Ave. (19144) .....P
1960. Blake, Alton D., Jr., 960 County Line Rd., Bryn-Mawr, Pa. (19010) I
1952. Blake, Paul O., 273 N. Lansdowne Ave., Lansdowne, Pa. (19050) .....FP S
1958. *Blakemore, William S., 419 S. 19th St. (19146) .....S TS
1971. Blizzard, John J., 2200 Providence Road, Chester, Pa. (19013) .....END
1917. Block, Frank B., A1124 Park Drive Manor (19144) .....S
1963. Block, Reuben, 1555 Haddon Ave., Camden, N.J. (08103) .....U
1969. Blocklyn, Maurice J., School Lane, Rose Valley, Moylan, Pa. (19065) .....R
1972. Bloom, Shirley S., 51 N. 39th St. (19104) .....ANES
1973. *Blumstein, Charles G., 711 Swade Rd., Erdenheim, Pa. (19018) .....A
1949. *Blumstein, George I., 2039 Delancey St. (19103) .....I A
1929. *Bockus, Henry L., 250 S. 18th St. (19103) .....I GE
1928. *Boles, Russell S., Rittenhouse Plaza, 1901 Walnut St. (19103) .....I GE
1961. Bongiovanni, Alfred M., 1740 Bainbridge St. (19146) .....Pd
1948. Bookhammer, Robert S., 249 Hilldale Rd., Villanova, Pa. (19085) .....P
1947. Bourland, Henry S., 2219 Garrett Rd., Drexel Hill, Pa. (19026) .....PR
1961. Bouzarth, William F., Episcopal Hospital (19125) .....NS PrM
1961. Bove, Frank A., 2301 Pennsylvania Ave. (19130) I
1972. Bovee, 3800 Spruce St., (19104) .....DVM
1968. Bowen, Thales, Jr., Lankenau Hosp. (19151) .....ANES
1954. Bowers, Paul A., 2031 Locust St. (19103) .....OBG
1942. Bowie, Morris A., Bryn Mawr Medical Bldg., Bryn Mawr, Pa. (19010) .....I RHEUM
1963. Boyer, Randall A., Holy Redeemer Hospital, Meadowbrook, Pa. (19046) ...R
1964. Brackin, John T., Jr., 773 Roslyn Ave., Glenside, Pa. (19038) .....R
1971. Bradley, Robert H., Jr., 33 E. Chestnut Hill Ave. (19118) .....U
1965. Brady, Anna M., 3302 W. Queen Lane (19129) .....OR REH
1959. Brady, Luther W., 230 N. Broad St. (19102) .....R
1954. Bralow, S. Philip, 1025 Walnut St. (19107) .....I GE
1948. Braun, William, 406 Cooper St., Camden, N.J. (08102) .....OPH

* S. Weir Mitchell Associate.

1953. *Brav, Solomon S., 5575 N. Park Ave. (19141) ..... OPH
1953. Breckenridge, Robert L., 13 Cunningham Lane, Cherry Hill, N.J. (08034) .. PATH
1964. Brenman, Arnold K., 8040 Roosevelt Blvd. (19102) ..... ALR
1972. Brennan, James T., 3400 Spruce St. (19104) ..... R
1966. Brent, Robert L., Jefferson Medical College (19107) ..... Pd
1961. Breslow, Irwin H., 1924 Panama St. (19103) I
1946. *Briscoe, Clarence Conway, 811 Spruce St. (19107) ..... OBG
1953. Brobeck, John R., Univ. of Pa. School of Medicine (19104) ..... RES NP
1958. Brody, Henry, Einstein Medical Center, York & Tabor Rds. (19141) ..... PATH
1965. Brody, Jerome I., Graduate Hospital, 19th & Lombard Sts. (19146) ..... I HEMA
1952. Brody, Morris W., 2 W. Levering Mill Rd., Cynwyd, Pa. (19004) ..... P
1948. Brogan, Edmund J., 4601 Market St. (19139) ..... ALR
1958. Brooks, Frank P., Hospital of the Univ. of Pa. (19104) ..... GE
1932. *Brown, Claude P., 6401 Wissahickon Ave. (19119) ..... PATH
1963. Browne, Laurence T., Presidential Apts., D126 (19131) I
1971. Brucker, Paul C., Thomas Jefferson Univ., 1025 Walnut St. (19107) ..... FP
1961. Brunt, Manly Y., 111 N. 49th St. (19139) ..... P
1939. Brust, Raymond M., 301 Mill Rd., Havertown, Pa. (19083) ..... I A
1969. Bryant, Winston M., Jr., 5900 Spruce St. (19139) ..... OPH
1971. Buch, Heriberto E., 211 Shadeland Ave., Lansdowne, Pa. (19050) ..... OPH
1969. Buchheit, William A., 3401 N. Broad St. (19140) ..... NS
1961. Buerk, Minerva S., Bryn Mawr Medical Bldg., Bryn Mawr, Pa. (19010) .... D
1971. Bullock, Samuel C., 6th floor, 5000 Woodland Ave. (19143) ..... P
1973. Burg, Fredric D., 3930 Chestnut St. (19104) ..... Pd
1962. *Burgoon, Carroll F., Jr., Skin & Cancer Hospital, 3322 N. Broad St. (19140) ..... D
1940. *Burnett, W. Emory, 47 E. Righters Mill Rd., Narberth, Pa. (19072) ..... S
1966. Burns, William P., Scheie Inst., 51 N. 39th St. (19104) ..... OPH
1954. Burros, Harry M., 419 S. 19th St. (19146) ..... U
1968. Burrows, Stanley, Cooper Hosp., Camden, N.J. (08103) ..... PATH
1966. Burstein, Frank, 8541 Bustleton Ave. (19152) ..... FP
1970. Butcher, James, 51 N. 39th St. (19104) ..... PATH
1941. Butler, Miriam, Watersmeet, Glen Mills, Pa. (19342) I
1957. *Butterworth, Thomas, 411 Walnut St., Reading, Pa. (19601) ..... D
1965. Byron, Harold J., Wyncote House, Wyncote, Pa. (19095) ..... PN
1966. Cahn, Milton M., 1930 Chestnut St. (19103) ..... D
1957. Calhoun, John Alfred, Jr., P.O. Box A, Swarthmore, Pa. (19081) ..... OM
1958. Cameron, Charles S., 230 N. Broad St. (19102) ..... ADM
1962. Camishion, Rudoph C., Suite 303, Cooper Parkway West, N. Park Drive & Airport Highway, Pennsauken, N.J. (08109) ..... S
1972. Camp, William P., Adams Ave. & Roosevelt Blvd. (19124) ..... P ADM
1964. Cancelmo, Jesse J., Jr., 337 W. Lancaster Ave., Wayne, Pa. (19087) ..... S
1970. Canino, Christopher W., 1900 S. Broad St. (19145) ..... R
1967. Carabasi, Ralph A., 255 S. 17th St. (19103) I
1935. Carey, Lawrence S., 2241 Garrett Road, Drexel Hill, Pa. (19026) I
1971. Carfagno, Salvatore C., 1401 De Kalb St., Norristown, Pa. (19401) I
1970. Carmichael, Paul L., 601 E. Main St., Lansdale, Pa. (19446) ..... OPH
1959. Carrington, Elsie R., The Medical College of Pennsylvania (19129) ..... OBG
1960. Carroll, Robert T., 1015 Chestnut St., Jefferson Bldg., Room 803 (19107) .. I HEMA
1917. Carson, John B., Newton Square, Pa. (19073) I
1956. Casey, Paul R., 8350 Roosevelt Blvd. (19152) ..... S
1943. Castigliano, S. Gordon, Central & Shelmire Aves. (19111) ..... R S
1949. Caswell, H. Taylor, 3401 N. Broad St. (19140) ..... S
1954. Cathcart, Richard T., Jefferson Hospital, 1025 Walnut St. (19107) ..... PUL
1950. *Chamberlain, Richard H., 3400 Spruce St. (19104) ..... R
1939. Chamberlin, George W., Reading Hospital, Reading, Pa. (19602) ..... R

* S. Weir Mitchell Associate.

1967. Chambers, Richard A., 1025 Walnut St. (19107) ..... N
1966. Chamblin, William D., Suite 303, 3900 Powelton Ave. (19104) ..... OBG
1945. Chance, Burton, Jr. 4400 Baltimore Ave. (19104) ..... OR
1958. Channick, Bertram J., 3701 N. Broad St. (19140) I
1954. *Charny, Charles W., 2039 Delancey Pl. (19103) ..... U
1966. Chernoff, Benjamin, 6901 Old York Rd. (19126) I
1969. Chesnick, Reuben B., 517 Penn St., Camden, N.J. (08102) ..... R
1960. Chirico, Anna-Marie, Hosp. of Univ. of Pa. (19104) I
1966. Chisum, Melvin J., 245 N. Broad St. (19107) I
1971. Chmielewski, Robert E., 8040 Roosevelt Blvd. (19152) ..... HEMA
1939. Ciccone, Emmet F., 2000 Willowbrook Rd., Huntingdon Valley, Pa. (19006) . PATH
1960. Clader, Stanley C., 825-A Glenbrook Ave., Bryn Mawr, Pa. (19010) ..... OBG
1951. Clagett, A. Henry, Jr., 515 W. Eighteenth St., Wilmington, Del. (19802) ... C
1966. Clark, Gerald R., Elwyn School, Elwyn, Pa. (19063) ..... P
1962. Clark, James E., Crozer-Chester Med. Center, 15th & Upland Aves., Chester, Pa. (19013) I
1951. Clark, John Kapp, 843 Parkes Run Lane, Villanova, Pa. (19085) I
1947. *Clark, Thomas William, 6 Moreland Circle (19118) ..... I C
1971. Clearfield, Harris R., 720 Oxford Road, Bala-Cynwyd, Pa. (19004) I
1963. Cleveland, Albert F., 615 Morgan Ave., Drexel Hill, Pa. (19026) ..... OPH
1972. Close, Henry P., 8835 Germantown Ave. (19118) I
1972. Coffey, William F. X., Bryn Mawr & Highland Ave., Bala-Cynwyd, Pa. (19004) I
1969. Cohen, Erwin A., 6735 Harbison Ave. (19149) ..... S
1973. Cohen, Herbert E., 225 S. Van Pelt St. (19103) I
1970. Cohen, Norman N., Mercy Catholic Med. Cntr., Darby, Pa. (19023) ..... GE
1953. Cohen, Robert V., 520 Spring Ave., Elkins Park, Pa. (19117) I
1967. *Cohen, Sarle H., 1201 W. Olney Ave. (19141) ..... I ARTH
1965. Cohn, Edwin M., 1351 Tabor Rd. (19141) ..... I GE
1964. Cohn, Herbert E., 829 Spruce St. (19107) ..... S TS
1970. Cohn, Ronald E., 4940 Frankford Ave. (19124) ..... I END
1949. Conger, Kyril B., 3401 N. Broad St. (19140) ..... U
1971. Connor, Robert W., 601 E. Main St., Lansdale, Pa. (19446) ..... OPH
1961. Coon, Julius M., 1025 Walnut St. (19107) ..... PHARM
1945. Coonel, Pauline, 47 E. Mt. Pleasant Ave. (19119) ..... ALR
1953. *Cooper, Donald R., 3300 Henry Ave. (19129) ..... S
1960. Cooper, Edward Sawyer, 6710 Lincoln Drive (19119) I
1947. Coppolino, John F., 22 Pickthorn Drive, Batavia, N.Y. (14020) ..... Pd
1952. *Corbit, John D., Jr., 414 Lankenau Medical Bldg. (19151) ..... G
1973. Coriell, Lewis L., 12 Lincoln Terrace, Moorestown, N.J. (08057) ..... S
1972. Cornman, Henry D., III, 801 Old Lancaster Road, Bryn Mawr, Pa. (19010) .. PATH
1959. Cormeny, George F., 3818 Chestnut St. (19104) I
1965. Cornelison, Floyd S., Jr., 1127 Walnut St. (19107) ..... P
1970. Cossa, John P., 1900 S. Broad St. (19145) ..... S
1940. Cowan, Thomas H., 1930 Chestnut St. (19103) ..... OPH
1966. Cram, Robert H., 918 County Line Rd., Bryn Mawr, Pa. (19010) ..... OR
1947. *Crane, A. Reynolds, Pennsylvania Hospital (19107) ..... PATH
1973. Creech, Richard H. 1135 Goodman Ave., Fort Washington, Pa. (19034) .... ONC
1952. Crellin, J. Antrim, 1930 Chestnut St. (19103) ..... PUL
1970. Cresson, Samuel L., Lankenau Medical Building (19151) ..... S Pd
1955. Crist, Walter A., 211 N. 5th St., Camden, N.J. (08102) C
1968. Croll, Millard N., Hahnemann Hosp. (19102) ..... R
1973. Cundy, Kenneth R., 235 Lemon Hill Court, 4000 Gypsy Lane (19144) ..... Ph.D. MCIRO
1959. Cullen, Milton L., 1936 Cottman Ave. (19111) ..... S
1962. Cunningham, John D., 105 39th St., Avalon, N.J. (08202) ..... ALR
1934. Custer, R. Philip, 643 Moreno Road, Narberth, Pa. (19072) ..... PATH HEMA ONC

* S. Weir Mitchell Associate.

1958. D'Alonzo, Walter A., 1647 S. 15th St. (19145) ..... S
1938. Dannenberg, Arthur M., Sr., 235 S. 15th St. (19102) ..... Pd
1968. Daughtridge, Truman G., 8835 Germantown Ave. (19118) ..... R
1969. Davidson, Jay H., 1002 Spruce St. (19107) ..... I GE
1953. Davie, John H., 216 N. Broad St. (19102) I
1947. *Davis, C. Nelson, 524 Howe Rd., Merion Station, Pa. (19066) ..... N P
1936. Davis, David M., 818 Pennstone Rd., Bryn Mawr, Pa. (19010) ..... U
1951. *Davis, J. Wallace, 135 S. 18th St. (19103) ..... PL
1961. Dawber, Bryan A., Penn Mutual Life Insurance Co. (19105) ..... INS
1971. Deakins, James S., 33 E. Chestnut Hill Ave. (19118) ..... OR
1971. Deas, Thomas C., 3401 N. Broad St. (19140) ..... ANES
1935. *Deaver, J. Montgomery, Lankenau Medical Bldg. (19151) ..... S
1957. Decker, John Paul, Pennsylvania Hospital (19107) ..... PATH
1957. Dees-Porch, Frances, Glendale Road & Chestnut Sts., Upper Darby, Pa. (19082) ..... OBG
1958. Dietz, George W., III, 2240 Pine Rd., Huntingdon Valley, Pa. (19006) C
1952. DeLuca, Charles Q.. 255 S. 17th St. (19103) ..... ALR
1969. Denbo, Elic A., 300 Broadway, Camden, N.J. (08103) ..... P
1952. De Orsay, Ralph H., 1241 Lindale Ave., Drexel Hill, Pa. (19027) ..... FP
1951. *De Palma, Anthony F., 248 S. 21st St. (19103) ..... OR
1963. Derham, Robert J., McClatchy Bldg., Upper Darby, Pa. (19082) ..... S
1966. deRivas, Carmela F., 700 Joseph Dr., Wayne, Pa. (19087) ..... P
1969. Desiderio, Vincent C., 1907 S. Broad St. (19148) I
1959. DeTuerk, John J., 2301 S. Broad St. (19148) ..... S
1971. Deutsch, Joel, Episcopal Hosp., Front & Lehigh Ave. (19125) ..... S
1959. Dickens, Helen O., University of Pa. Hosp. (19104) ..... OBG
1968. Dickensheets, James G., 223 S. 6th St., Camden, N.J. (08103) I
1958. Dickstein, Benjamin, 6810 Castor (19124) ..... Pd
1952. Digilio, Victor A., 2200 St. James Place (19117) ..... I C
1963. DiMarino, Anthony J., 735 Delaware St., Paulsboro, N.J. (08066) I
1960. Dinon, Louis R., 330 S. 9th St. (19107) ..... I C
1968. Di Palma, Joseph R., 235 N. 15th St. (19102) I
1973. Dodds, H. Thomas, 148 David Drive, Havertown, Pa. (19083) ..... OPH
1948. Dohan, Frances Curtis, 80 Princeton Road, Cynwyd, Pa. (19004) I
1969. Dolphin, John M., 235 N. 15th St. (19102) ..... PATH
1972. Dombkoski, Walter J., 3201 Comly Place (19154) ..... S
1954. Donaldson, James B., 3401 N. Broad St. (19140) I
1967. Donnelly, Joseph C., Jr., Lankenau Medical Bldg. (19151) ..... TS
1967. Dougherty, Malvin J., 34 Copley Rd., Upper Darby, Pa. (19082) ..... OPH
1964. Dratman, Mary B., Henry Ave. & Abbottsford Road (19129) I
1952. Drayer, Calvin S., 111 N. 49th St. (19139) ..... PN ChiP
1949. *Dripps, Robert D., 3400 Spruce St. (19104) ..... ANES
1969. Drossner, Jacob L., 101 E. Cooper River Plaza, Pennsuaken, N.J. (08109) I
1935. Duncan, Garfield G., 330 S. 9th St. (19107) I
1966. Duncan, Theodore G., 330 S. Ninth St. (19107) I
1953. Dupler, Donald A., 4028 Walnut St. (19104) ..... I C
1942. *Durant, Thomas M., 1242 Lafayette Rd., Gladwyne, Pa. (19035) ..... I C
1962. D'Zmura, Thomas L., 944 Summit Ave., Narberth, Pa. (19072) ..... P
1969. Dzwonczyk, John, Jr., 45 Ashby Rd., Upper Darby, Pa. (19082) ..... S
1936. Easby, Mary Hoskins, R.D. 2, Shelburne, Vt. (05482) I
1966. Ehrlich, George E., Albert Einstein Medical Center, N.D. (19141) ..... I ARTH
1956. *Eiman, John W., Abington Memorial Hospital, Abington, Pa. (19001) ..... PATH
1959. Eisenhower, James S. D., Jr., 2704 Pacific Ave., Wildwood, N.J. (08260) ..... FP
1958. *Eisman, Sylvan H., 3600 Spruce St. (19104) I
1971. Eisner, Joel W., 603 S. Main St., Phoenixville, Pa. (19460) I
1959. Elias, Elmer J., 10 Monticello Ave., Trenton, N.J. (08618) ..... PM REH

* S. Weir Mitchell Associate.

1961. Elliott, Frank A., 807 Spruce St. (19107) ..... N
1957. Ellis, Richard A., 255 S. 17th St. (19103) ..... OPH
1955. Ellis, Samuel, 275 Bryn Mawr Ave., Bryn Mawr, Pa. (19010) ..... FP
1939. Ellis, Van Mashburn, 327 S. Hicks St. (19102) ..... OPH
1928. Ellison, Richard T., Medical Office Bldg., 1245 Highland Ave., Abington, Pa. (19001) I
1936. Ellson, J. Vernon, Glendale Road & Chestnut St., Upper Darby, Pa. (19082) ..... OBG
1937. *Elsom, Kendall A., Scott Paper Co. (19113) ..... I OM IND
1932. Engel, Gilson C., Lankenau Medical Bldg. (19151) ..... S
1945. *English, O., Spurgeon, 449 Righters Mill Rd., Narberth, Pa. (19072) ..... P
1973. Engstrom, Paul F., Central & Shelmire Aves. (19111) ..... HEMA ONC
1973. Enterline, Horatio T., 13 Manchester Ave., Moylan, Pa. (19065) ..... PATH
1965. Epstein, Isadore S., 3950 Conshohocken Ave. (19131) ..... I A
1942. Erb, William H., Medical Bldg., Presbyterian-Univ. of Penna. Med. Center, 3910 Powelton Ave. (19104) ..... S
1957. Erdman, William James, II, 3400 Spruce St. (19104) ..... PM
1965. Erslev, Allan J., 1015 Sansom St. (19107) ..... I HEMA
1957. Etzl, Michael M., 9025 Franford Ave. (19114) ..... I C
1955. Eynon, Harold K., Route 70 at East Gate, Barclay Farm, Cherry Hill, N.J. (08033) I
1968. Faludi, Georgina, Hahnemann Hosp. (19102) I
1946. Farell, David M., 1912 Spruce St. (19103) ..... OBG
1945. Farrar, George Elbert, Jr., 528 Scott Rd., Gladwyne, Pa. (19035) I
1953. Farrell, Harry L., The Chatham, 135 S. 20 St. (19103) ..... S
1964. Faust, Herbert A., Paoli Memorial Hosp. Med. Bldg., W. Lancaster Ave., Paoli, Pa. (19301) ..... N
1936. *Fetter, Ferdinand, 322 S. 21st St. (19103) I
1952. *Fields, Harry, 133 S. 36th St. (19104) ..... OBG
1959. *Fineberg, Charles, Franklin Med. Bldg., 829 Spruce St. (19107) ..... S TS
1955. Finestone, Albert J., 3701 North Board St. (19140) I
1955. Finkelstein, David, 419 S. 19th St. (19146) ..... I C
1955. *Finley, John K., King's Highway West, Haddonfield, N.J. (08033) ..... OPH
1954. *Finn, Joseph L., 8014 Burholme Ave. (19111) ..... OBG
1947. First, Arthur, 255 S. 17 St., Suite 2000 (19103) ..... OBG
1954. Fischer, Carl C., 2200 S. Ocean Blvd., Delray Beach, Fla. (33444) ..... Pd
1950. *Fischer, H. Keith, School House Lane, 5450 Wissahickon Ave. (19144) ..... P
1962. Fisher, George R., III, Suite 308, 829 Spruce St. (19107) I
1958. Fisher, Robert M., 118 Airdale Rd., Rosemont, Pa. (19010) ..... FP
1970. Fishman, Alfred P., 871 Maloney Bldg., HUP (19104) I
1956. Fite, Franklin K., Germantown Hosp. (19144) ..... PATH
1952. Fitts, William T., Jr., 3400 Spruce St. (19104) ..... S
1971. Flandreau, Richard H., Media Clinic, Media, Pa. (19063) ..... S
1970. Fleischmajer, Raul, 230 N. Broad St. (19102) ..... D
1952. Flexner, Louis B., 248 Anatomy-Chemistry Bldg., Univ. of Pa. (19104) ..... ANAT
1928. *Flick, John B., 819 Black Rock Rd., Gladwyne, Pa. (19035) ..... S TS
1957. Fornwalt, George R., 47 Copley Rd., Upper Darby, Pa. (19082) ..... OBG
1954. Forster, H. Walter, Jr., 37 S. 20th St. (19103) ..... OPH
1960. Foulger, John H., 601 Rockwood Rd., Wilmington, Del. (19802) ..... OM
1972. Fox, Claire G., 380 Shady Retreat Road, Doylestown, Pa. (18901) ..... Ph.D.
1963. Frank, Paul E., York Road & Summit Ave., Hatboro, Pa. (19040) ..... OPH
1963. Frank, Robert L., 1282 Rydal Rd., Rydal, Pa. (19046) ..... OPH
1968. Frankl, William S., 1121 Cornwall Lane, St. Davids, Pa. (19087) I
1955. Frayer, William C., Scheie Eye Inst., 51 N. 39th St. (19104) ..... OPH
1941. Frazier, William Doane, 419 Gilpin Rd., Narberth, Pa. (19072) ..... S IND

* S. Weir Mitchell Associate.

1972. Frederic, Myron W., 51 N. 39th St. (19104) ..... I N
1952. Freed, Herbert, 255 S. 17th St. (19103) ..... PN
1956. Freeman, Joseph T., 1530 Locust St. (19102) I
1958. Freiwald, Milton J., 222 S. 19th St. (19103) ..... OPH
1955. Friedenberg, Zachary B., 133 S. 36th St. (19104) ..... OR
1951. Friedman, Paul Sigmund, 1422 Chestnut St. (19102) ..... R
1960. Friedman, Sidney, 1740 Bainbridge St. (19146) ..... Pd PdC
1958. Frisch, Frederick, 7 S. Dudley Ave., Ventnor City, N.J. (08046) ..... OPH
1937. Fritz, Herbert H., Pennswood Rd., Bryn Mawr, Pa. (19010) ..... FP
1961. Frobese, Alfred S., Abington Memorial Hosp., Abington, Pa. (19001) ..... S TS
1935. Fry, Wilfred Eyles, 1930 Chestnut St. (19103) ..... OPH
1963. Furgiuele, Francis P., 5430 Greene St. (19144) ..... OPH
1937. Furlong, Thomas F., Jr., 630 Black Rock Rd., Bryn Mawr, Pa. (19010) ..... ALR
1967. Futcher, Palmer H., 3930 Chestnut St. (19104) I
1972. Gabrielson, Ira W., 3300 Henry Ave. (19129) ..... PM
1964. Galligan, William J., 2909 Garrett Road, Drexel Hill, Pa. (19026) I
1954. Gambescia, Joseph M., 1907 S. Broad St. (19148) ..... I GE
1969. Ganz, Michael A., R.D. #2, Box 207, Perkasie, Pa. (18944) ..... P
1966. Garcia, Celso-Ramon, University Hospital (19104) ..... OBG
1971. Gardner, Frank H., 51 N. 39th St. (19104) ..... I HEMA
1951. Garlichs, Richard W., 216 N. Manoa Road, Havertown, Pa. (19083) ..... ALR A
1931. Garner, Vaughn C., 477 East Wadsworth St. (19119) ..... D
1953. Garnet, James D., 807 Spruce St. (19107) ..... OBG
1959. Gartland, John J., 621 Curtis Clinic Bldg., 1015 Walnut St. (19107) ..... OR
1950. Garvin, Eugene J., 533 S. 46th St. (19143) ..... OM
1972. Gatter, Robert A., 1245 Highland Ave., Abington, Pa. (19001) I
1958. Geckeler, George D., 22 W. Bells Mill Rd. (19118) C
1952. Gefter, William I., Episcopal Hosp. (19125) I
1969. Gehring, David A., Medical Arts Bldg., Suite 21, W. Red Bank Ave., Woodbury, N.J. (08096) ..... I C
1935. Geist, Donald C., 1205 Penn Wynne House, 2201 Bryn Mawr Ave., Bryn Mawr, Pa. (19010) ..... S
1955. Gelfand, David, 1722 Pine St. (19103) ..... I C
1969. Gellhorn, Alfred A., 3400 Spruce St. (19104) ..... ADM
1965. Georges, Thomas W., Jr., 3400 N. Broad St. (19140) ..... PH
1959. Gerson, Irvin M., Cedarbrook Apts., Cedarbrook Hills, Wyncote, Pa. (19095) ..... NP
1968. Gerstley, Louis, III, Cedarbrook Hill Apt. CM23, Wyncote, Pa. (19095) ..... OBG
1965. Gianakon, Harry G., 111 N. 49th St. (19139) ..... P
1939. *Gibson, Glen Gregory, 2031 Locust St. (19103) ..... OPH
1944. Gifford, Edwards S., Jr., 1913 Spruce St. (19103) ..... OPH
1956. Gilbert, Philip D., Cooper Hospital, Camden, N.J. (08103) ..... R
1967. Gilbert, Robert P., 1025 Walnut St. (19107) I
1947. Giletto, Basil J., 2020 Locust St. (19103) ..... OBG
1955. Gill, Robert J., 715 Spruce St. (19106) I
1952. Gilpin, Sherman F., Jr., 1023 Beury Building, 3701 N. Broad St. (19140) ..... PN
1965. Ginley, Thomas H., Jr., Presidential Apts. (19131) ..... U
1949. Ginsburg, Isadore W., 3401 N. Broad St. (19140) I
1958. Girsh, Leonard S., Benjamin Fox Pavilion, Jenkintown, Pa. (19046) I
1954. Gislason, Gerhard J., 1245 Highland Ave., Abington, Pa. (19001) ..... U
1971. Glaser, Frederick B., EPPI, Henry Ave., & Abbottsford Rd. (19129) ..... P
1973. Glass, Dorothea D., 935 Melrose Ave., (19126) ..... PM
1972. Glauser, Felix E., Front & Lehigh Ave. (19125) ..... S
1967. Glauser, Stanley C., 630 Richards Rd., Wayne, Pa. (19087) ..... Pd
1964. Gloeckner, M. Louise C., 110 E. Fourth Ave., Conshohocken, Pa. (19428) ..... FP

* S. Weir Mitchell Associate.

1956. Goldberg, Harry, 7913 Rolling Green Rd., Cheltenham, Pa. (19012) C
1973. Goldberg, Martin, 158 Gramercy Rd., Bala-Cynwyd, Pa. (19004) ..... P
1970. Goldberg, Richard E., 1333 Buck Road, Feasterville, Pa. (19048) ..... OPH
1965. Goldburgh, Warren P., 275 S. 19th St. (19103) ..... I C
1971. Goldfarb, Alvin F., 829 Spruce St. (19107) ..... OBG
1969. Goldman, Leonard I., Temple Univ. Hosp. (19140) ..... S
1972. Goldsmith, Harry S., 1025 Walnut St. (19107) ..... S
1965. Goodman, David H., 6816 Castor Ave. (19149) I
1956. Goracci, Armando F., Medical Arts Bldg., Woodbury, N.J. (08096) ..... S
1968. Gordon, Jacob S., 5119 N. Broad St. (19141) ..... PR
1968. Gordon, Kenneth H., Jr., 1250 Upper Gulph Rd., Radnor, Pa. (19087) ..... P
1937. Gordon, William, 5345 Spruce St. (19139) ..... ALR
1968. Gordy, Philip D., 1025 Walnut St. (19107) ..... NS
1964. Gottlieb, Harry, 5555 Wissahickon Ave. (19144) I
1964. Gottlieb, Philip M., 818 Medical Arts Bldg., 16th & Walnut Sts. (19102) .... I A
1967. Gould, Robert A., 701 N. Pennsylvania Ave., Morrisville, Pa. (19067) I
1956. *Gouley, Benjamin, 1201 W. Olney Ave. (19141) ..... I C
1966. Gowen, George F., Misericordia Hospital (19143) ..... S
1971. Graff, Harold, 111 N. 49th St. (19139) ..... P
1966. Grant, B. David, Sprowl & Lawrence Rd., Broomall, Pa. (19008) ..... OR
1965. Grassi, Michael O. A., 2038 Locust St. (19103) ..... P N
1965. Greenbaum, Charles H., 8220 Castor Ave. (19152) ..... D
1972. Greenberg, Leonard, 1335 Tabor Road. (19141) ..... N
1971. Greenberg, Jack O., Front & Lehigh Ave. (19125) ..... N
1940. Greene, Lloyd B., 326 S. 19 St. (19103) ..... U
1973. Greenfield, Val S., 2036 Spring Garden St. (19103) ..... OPH
1952. *Greening, Roy R., 801 Broadway, Seattle, Wash. (98104) ..... R
1941. *Groff, Robert A., Suite 2306-08 Medical Tower, 255 S. 17th St. (19103) .... PN NS
1952. *Grotzinger, Paul J., 2121 Valley Rd., Hungtingdon Valley, Pa. (19006) ..... S ONC
1952. *Grove, D. Dwight, 5025 N. Marvine St. (19141) ..... ANES
1966. Guthrie, Marshall B., 1500 Spring Garden St. (19101) ..... D
1945. György, Paul, Philadelphia General Hospital (19104) ..... Pd
1969. Haase, Gunther R., 3401 N. Broad St. (19140) ..... N
1935. Hadden, Samuel B., 946 Remington Rd., Wynnewood, Pa. (19096) ..... PN
1945. Hahn, George A., 255 S. 17th St. (19103) ..... OBG
1967. Haines, Keith E., 300 S. Broadway, Camden, N.J. (08103) ..... OR
1972. Haines, William F., 702 Monument Road, Malvern, Pa. (19355) ..... A FP
1964. Hall, John H., 3401 N. Broad St. (19140) ..... S
1955. Hallahan, John D., 104 W. Front St., Media, Pa. (19063) I
1951. Hallett, Joseph W., 136 S. 16th St. (19102) ..... OPH
1972. Hamilton, John W., 33 E. Chestnut Hill Ave. (19118) ..... DDS
1961. Hammett, Van Buren O., 249 N. Broad St. (19107) ..... D
1967. Hammond, Jonathan A., 433 Bellevue Ave., Trenton, N.J. (08618) ..... S
1954. Hand, B. Marvin, 1801 Pennsylvania Blvd. (19103) ..... PN
1938. Hand, John G., 1724 Pine St. (19103) ..... S
1964. Hanes, Robert B., Ashby Rd. & Chestnut St., Upper Darby, Pa. (19082) ....
1963. Hanhausen, Edward H., 418 E. Lancaster Ave., Wayne, Pa. (19087) ..... OPH
1950. Hansen, A. Victor, 910 Centennial Rd., Penn Valley, Narberth, Pa. (19072) . P
1970. Hardesty, William H., 433 Bellevue Ave., Trenton, N.J. (08607) ..... S
1951. Harkins, Herbert P., Suite 122 Lankenau Hosp. Med. Bldg. (19151) ..... ALR
1971. Harley, Robison D., 1601 Spring Garden St. (19130) ..... OPH Pd
1966. Harner, Richard N., Graduate Hospital (19146) ..... N
1962. Harris, James R., 3222 W. Penn St. (19129) ..... P
1959. Harris, James S. C., Medical Office Bldg., 666 E. Penn St. (19144) ..... S TS
1948. Harris, T. N., 5112 Woodbine Ave. (19131) ..... LAB RES

* S. Weir Mitchell Associate.

1961. Harvie, Fred H., 20 E. Newfield Way, Bala Cynwyd, Pa. (19004) ..... Pd
1972. Harwick, Robert D., 2201 Benjamin Franklin Parkway (19103) ..... S
1935. *Haskell, Benjamin F., 1427 Spruce St. (19102) ..... PR
1968. Haskin, Marvin E., Hopkinson House (19106) ..... R
1958. Haupt, George J., Lankenau Medical Bldg. (19151) ..... S TS
1960. Hausman, David H., Pennsylvania Hospital, 8th & Spruce Sts. (19107) ..... PATH
1947. Havens, Walter Paul, Jr., 139 Cheswald Lane, Haverford, Pa. (19040) I
1947. *Hawthorne, Herbert R., 3625 Darby Rd., Bryn Mawr, Pa. (19010) ..... S
1963. Hayes, Merrill B., 608 University Place, Swarthmore, Pa. (19081) ..... ALR
1952. Hayllar, Benjamin L., Bryn Mawr Med. Bldg., Bryn Mawr, Pa. (19010) ... U
1961. Hayward, Malcolm L., 560 Maplewood Rd., Wayne, Pa. (19087) ..... P
1961. Heath, Frederick K., 230 N. Broad St. (19102) I
1972. Heaton, Charles L., Duhring Labs., 3400 Spruce St. (19104) ..... D FP
1957. Hedges, Thomas R., Jr., Pine Bldg., Penn. Hosp, 8th & Spruce Sts. (19107) ..... OPH
1961. Heggestead, Gilman E., 207 Bryn Mawr Bldg., Bryn Mawr, Pa. (19010) .... S
1965. Heil, Charles G., Jr., 253 Pepper Road, Huntingdon Valley, Pa. (19006) ... OBG
1965. Heine, William I., 5579 N. Park Ave. (19141) ..... C I
1967. Helwig, John, Jr., Germantown Hosp. (19144) ..... C I
1972. Henderson, Theodore A., 500 Willow Ave., Ambler, Pa. (19002) C
1944. Herbut, Peter A., Dept. of Pathology, Jefferson Medical College Hospital (19107) ..... PATH
1971. Hermel, Mortimer B., 255 S. 17th St. (19103) ..... R
1954. Herron, James R., 1055 Haddon Ave., Collingswood, N.J. (08108) ..... OBG
1963. Hesch, Joseph A., Mercy Catholic Med. Center, Darby, Pa. (19023) ..... Pd
1949. Heyl, W. Meredith, Medical Office Bldg., 666 E. Penn St. (19144) ..... OBG
1961. *Hilferty, Daniel J., Jr., Apt. 506, 191 Presidential Blvd., Bala-Cynwyd, Pa. (19004) I
1952. Hinkson, DeHaven, 329 N. 40th St. (19104) ..... G
1972. Hipple, James W., 202 W. State St., Trenton, N.J. (08608) ..... DDS
1924. Hirst, John C., 2d., 2016 Rittenhouse Sq. (19103) ..... OBG
1944. Hnelski, Ignatius S., 802 S. 48th St. (19143) ..... C I
1943. Hockaday, Agnes, 316 Shadeland Ave., Drexel Hill, Pa. (19026) ..... FP
1947. *Hodges, John H., 1025 Walnut St. (19107) ..... I HEMA
1963. Hoffman, Carl J., 2901 Cottman Ave. (19149) ..... PN
1948. Hoffman, George L., Jr., 133 S. 36th St. (19104) ..... OBG
1965. Holfelner, Edward D., Chestnut St. & Ashby Road, Upper Darby, Pa. (19082) ..... U
1964. Hollander, George., 3500 Vista St. (19136) ..... C I
1949. Hollander, Joseph L., 36th & Spruce Sts. (19104) ..... I ARTH
1964. Holling, Herbert E., 3400 Spruce St. (19104) C
1951. Hollis, Charles B., The Cambridge Apts. (19144) ..... ENT
1952. Holloway, Edward E., 1736 Pine St. (19103) ..... C I
1966. Holly, Roy G., 1025 Walnut St. (19107) ..... OBG
1966. Holter, F. Robert, 1257 Inspiration Drive, La Jolla, Calif. (92037) ..... P ChiP
1971. Hooper, William E., 3401 N. Broad St. (19140) I
1953. Horan, Charles A., 272 N. Lansdowne Ave., Lansdowne, Pa. (19050) .... C I
1946. Horan, Gerald W., Marple-Newton Medical Bldg., Newton Square, Pa. (19073) ..... OPH
1947. *Horwitz, Orville, Pennsylvania Hosp., 8th & Spruce Sts. (19107) I
1973. Hosten, Edward B., 7600 Central Ave. (19111) ..... P
1950. Houlihan, Carl T., 819 Gatemore Rd., Bryn Mawr, Pa. (19010) ..... ENT
1944. Housel, Edmund L., 255 S. 17th St. (19103) I
1958. *Howard, John M., Crozer-Chester Med. Cntr., Upland, Chester, Pa. (19013) ..... S

* S. Weir Mitchell Associate.

1964. Howell, Doris A., 3300 Henry Ave. (19129) ..... Pd
1951. Hubbard, John P., 3930 Chestnut St. (19104) ..... Pd PH
1947. *Huber, John Franklin, Temple University School of Medicine (19140) .... ADM ANAT
1937. Hughes, Joseph, 111 N. 49th St. (19139) ..... P
1939. Hughes, P. Boland, 419 Hillbrook Rd., Bryn Mawr, Pa. (19010) ..... U S
1968. Hume, H. Alan, 3 E. Ridley Ave., Ridley Park, Pa. (19078) ..... S
1968. Hummeler, Klaus, Children's Hosp. (19146) ..... PATH
1951. Hundley, J. Warren, 600 Oxford Rd., Bala-Cynwyd, Pa. (19004) I
1954. Hunsicker, William C., Jr., 245 N. Broad St. (19107) ..... U
1946. Hunt, William T., Jr., Suite 945, 1617 J. F. Kennedy Blvd. (19103) ..... OPH
1921. Hunter, Robert John, 928 N. 63rd St. (19151) ..... ALR
1967. Huth, Edward J., American College of Physicians, 4200 Pine St. (19104) ... I
1952. Hyman, Harold L., 3401 N. Broad St. (19140) I
1950. *Imbriglia, Joseph E., 934 Cedar Grove, Wynnewood, Pa. (19096) ..... PATH
1949. Ingraham, Norman R., Jr., Stenton and Whitemarsh Aves. (19118) ..... PH
1957. Isaacson, Howard, Haverford Ave. & Drexel Rd. (19151) ..... OBG
1951. *Isard, Harold J., Albert Einstein Medical Center, York & Tabor Rds. (19141) ..... R
1951. *Israel, Harold L., 1825 Pine St. (19103) ..... PUL
1921. *Ivy, Robert H., 44 Pennock Terrace, Lansdowne, Pa. (19050) ..... S PL
1973. Jacobi, Athole G. McNeil, 2200 Benjamin Franklin Parkway (19130) ..... ANES
1967. Jacoby, Jay J., 1025 Walnut St. (19107) ..... ANES
1967. Jaeger, Edward A., Media Clinic, Media, Pa. (19063) ..... OPH
1965. Jenkins, B. Wheeler, 8351 Limekiln Pike, Wyncote, Pa. (19095) ..... FP
1943. *Johnson, Julian, 3400 Spruce St. (19104) ..... S TS
1938. Johnson, Thomas A., 135 S. 18th St. (19103) ..... I GE
1972. Johnston, Dudley E., 3800 Spruce St. (19104) ..... DVM
1963. Jones, Robert E., 111 N. 49th St. (19139) ..... P
1967. Jones, W. Mead, Somerset House, Fort Washington, Pa. (19034) ..... OPH
1966. *Joyce, John J., III, Medical Office Bldg., 666 E. Penn St. (19144) ..... OR
1936. Kain, Thomas M., 3025 W. Chapel Ave., Cherry Hill, N.J. (08034) .....
1969. Kain, Thomas M., Jr., Cooper Parkway W., Suite 301 N. Park Dr., Pennsauken, N.J. (08109) I
1948. Kaplan, Louis, 2040 Pine St. (19103) ..... S
1964. *Kaplan, S. Richard, 419 S. 19th St. (19146) ..... OR
1970. Kashatus, William C., 1036 Bloomfield Ave. (19115) ..... PATH
1958. Kasser, Max D., 101 S. 20th St. (19103) ..... OPH
1970. Kastor, John A., HUP, 3400 Spruce St. (19104) I
1971. Katowitz, James A., 1930 Chestnut St. (19103) ..... OPH
1945. Katz, G. Henry, 111 N. 49th St. (19139) ..... P
1941. Kauffman, M. Luther, Medical Arts Bldg., Jenkintown, Pa. (19046) ..... OPH
1947. Kay, Calvin Frederick, 4200 Pine St. (19104) C
1954. Kaye, Robert, Children's Hospital, 1740 Bainbridge St. (19146) ..... Pd
1972. Kean, Herbert, 255 S. 17th St. (19103) ..... ALR
1968. Keates, Edwin U., 2385 Cheltenham Ave. (19150) ..... OPH
1947. Keefer, George Pfahler, 136 S. 16th St. (19102) ..... R
1970. Keeler, Louis L., Jr., 501 Haddon Ave., Haddonfield, N.J. (08033) ..... U
1963. Keeley, Francis X., 501 Haddon Ave., Haddonfield, N.J. (08033) I
1966. Keeney, Arthur H., Wills Eye Hospital (19130) ..... OPH
1972. Keeney, Virginia T., 1404 W. Tioga St. (19140) ..... OPH
1949. Keiserman, Joseph, 1900 John F. Kennedy Blvd. (19103) I
1965. Kellow, William F. T., 1025 Walnut St. (19107) I
1932. *Kelly, Herbert T., 1830 Delancey Place (19103) I
1961. Kelly, William E., 111 N. 49th St. (19139) ..... P
1941. Kennedy, Patrick J., 32 Hampden Rd., Upper Darby, Pa. (19082) ..... OPH

* S. Weir Mitchell Associate.

1948. Kern, Franklin Moore, 903 Nicholson Rd., Wynnewood, Pa. (19096) ..... OBG
1921. *Kern, Richard A., Temple University Hospital, 3401 N. Broad St. (19140) .. I A
1935. Keyes, Baldwin, L., 2031 Locust St. (19103) ..... PN
1971. Kimbel, Philip, Albert Einstein Medical Center (N) (19141) ..... I PUL
1936. King, Orville S., 330 S. 9th St. (19107) ..... S
1970. King, Warren E., Jr., 230 N. Broad St. (19102) ..... ANES
1973. Kirkpatrick, John A., 537 Manor Rd., Wynnewood, Pa. (19096) ..... Pd R
1952. Kirschner, Jacob J., 1930 Chestnut St. (19103) ..... I PUL
1969. Kissick, William L., Dept. Community Med., 36th & Hamilton Walk (19104) ..... PrM
1960. Kitchell, J. Roderick, Abington Hospital Medical Office Bldg., 1245 Highland Ave., Abington, Pa. (19001) C
1954. Kligman, Albert M., 36th & Spruce Sts. (19104) ..... D
1934. Kline, Oram R., 896 Lake Ave., Woodbury Hts., N.J. (08097) ..... ALR
1959. Kline, Oram R., Jr., 406 Cooper St., Camden, N.J. (08102) ..... OPH
1948. Klingensmith, Paul O., Suite 305 Wynnewood House, 300 E. Lancaster Ave., Wynnewood, Pa. (19096) ..... OBG
1958. Klingensmith, Walter C., 3600 Spruce St. (19104) I
1956. Klinghoffer, June F., The Medical College of Pennsylvania (19129) I
1969. Klinghoffer, Leonard, 255 S. 17th St. (19103) ..... OR
1960. Knopf, Carl L., 2225 Garrett Rd., Drexel Hill, Pa. (19026) ..... OBG
1960. Knorr, John K., 3rd Lankenau Medical Bldg. (19151) ..... OBG
1959. Knowles, Harry J., 722 Righters Mill Rd., Narberth, Pa. (19072) ..... S
1973. Koblenzer, Caroline S., 159 Warren St., Edgewater Park, N.J. (08010) ... D
1969. Koblenzer, Peter J., 303 Chester Ave., Moorestown, N.J. (08057) ..... Pd D
1973. Koelle, Winifred A., 205 College Ave., Swarthmore, Pa. (19081) I
1959. Koiwai, Eichi Karl, 235 N. 15th St. (19102) ..... PATH
1957. Koltes, John A., 530 Spring Lane (19128) ..... P
1936. Konzelmann, Frank Williamson, 27 W. Wilmont Ave., Somers Point, N.J. (08244) ..... PATH
1949. *Koop, C. Everett, 1740 Bainbridge St. (19146) ..... S Pd
1964. Koppel, Max M., 7310 Castor Ave. (19115) ..... U
1972. Koprowska, Irena, 3401 N. Broad St. (19140) ..... PATH
1972. Koprowski, Hilary, Wistar Inst., 36th & Spruce Sts. (19104) ..... RES Micro
1972. Kotin, Paul, 3420 N. Broad St. (19140) ..... PATH
1971. Kozart, David M., 1930 Chestnut St. (19103) ..... OPH
1941. Krall, J. Thomas, 85 N. Landsdowne Ave., Landsdowne, Pa. (19050) ..... S
1972. Kraft, Albert J., Jr., 5 E. Chestnut Hill Ave. (19118) I
1973. Kramer, Janet P., 2911 Crossfork Dr., Wilmington, Del. (19801) ..... Pd
1954. *Krasnoff, Sidney O., Tabor Medical Bldg., York & Tabor Roads (19141) .. C I
1952. *Kravitz, Charles H., 626 Ashbourne Rd., Elkins Park, Pa. (19117) I
1964. Kremens, Victor, 5601 N. Broad St. (19141) ..... R
1949. Kressler, Robert J., 330 S. 9th St. (19107) ..... Pd
1968. Krishna, Narendra, 584 E. Chestnut St., Coatesville, Pa. (19320) ..... OPH
1947. Kuhlenbeck, Hartwig, 3300 Henry Ave. (19139) ..... ANAT
1964. Kustrup, John F., 1418 S. Broad St., Trenton, N.J. (08610) ..... S
1967. Kyle, George C., 3400 Spruce St. (19104) I
1947. La Boccetta, Alfred Charles, Chester City Health Dept., 326 N. Walnut St., W. Chester, Pa. (19380) ..... PRM PH
1952. *Lachman, John W., 3401 N. Broad St. (19140) ..... OR
1946. Lampe, William T., 4207 Tyson Ave. (19135) I
1962. Landis, Harry P., Jr., 901 Columbia Ave., Palmyra, N.J. (08065) ..... OPH
1952. *Lang, Warren R., Suite 1624, 1919 Chestnut St. (19103) ..... OBG PATH
1966. Langfitt, Thomas W., 3600 Spruce St. (19104) ..... NS
1941. Langner, Paul H., Jr., 1208 Edmonds Ave., Drexel Hill, Pa. (19026) ..... C I

* S. Weir Mitchell Associate.

1945. Lansbury, John, 3414 Brae Bourn Drive, Huntingdon Valley, Pa. (19006) ... I
1926. Laws, George M., 1907 Spruce St. (19103) ... G
1967. Lear, Walter J., Rm. 1300 State Office Bldg., 1400 Spring Garden St. (19130) ... PH
1950. Learner, Norman, 3701 N. Broad St. (19140) ... I
1920. Leavitt, Frederic Headley, 1527 Pine St. (19102) ... PN
1941. Leberman, Paul R., Hospital of the University of Pennsylvania (19104) ... U
1957. Lee, Charles Trumbull, Jr., 33 E. Chestnut Hill Ave. (19118) ... I
1971. Lee, K. Francis, 1025 Walnut St. (19107) ... R
1952. *Lehman, J. Stauffer, 3911 Central Ave., Ocean City, N.J. (08226) ... R
1961. Leibfried, Jane M., 5501 Green St. (19144) ... OBG
1951. Leivy, Frank E., Wm. Penn House, 1919 Chestnut St. (19103) ... I
1944. Lell, William A., 503 Auburn Ave. (19118) ... ALR
1935. Lemmon, William T., 1509 Sweet Briar Rd., Gladwyne, Pa. (19035) ... S
1969. Lentz, John W., 417 Lankenau Med. Bldg., Lancaster & City Line Ave. (19151) ... D
1971. Leonard, James R., Rittenhouse Med. Cntr., 1800 Spruce St. (19103) ... ALR
1965. Leopold, Howard C., Suite C-M1, Cedarbrook Hill Apt. 111, Greenwood Ave. & Limekiln Pike, Wyncote, Pa. (19095) ... I A
1955. Leopold, Robert L., Dept. Community Med., U of P, 36th & Hamilton Walk (19104) ... P
1967. Leslie, W. Munroe, 8800 Germantown Ave. (19118) ... FP
1969. Leto, Francesco, 1419 S. Broad St. (19147) ... I
1944. Lettiere, Anthony J., 425 E. State St., Trenton, N.J. (08069) ... S
1970. Leute, Millard S., INA, 1600 Arch St. (19101) ... OM INS
1965. Levenson, Carl, 619 Elkins Ave. (19117) ... PM
1959. Levick, Leonard J., 1335 Tabor Rd. (19141) ... I ONC
1971. Levin, Harvey M., 2301 S. Broad St. (19148) ... OBG
1958. Levine, Samuel, 7100 N. 19th St. (19126) ... S
1964. Levit, Edithe J., 3930 Chestnut St. (19104) ... Adm
1964. Levit, Samuel M., 1910 Spruce St. (19103) ... C I
1972. Levy, Walter M., 123 Pelham Rd. (19119) ... OR
1958. LeWinn, Edward B., Upper Black Eddy, Pa. (18972) ... I
1960. *Lewis, George C., Jr., 230 N. Broad St. (19102) ... OBG
1967. Lewis, Stuart H., 2050 W. Chester Ave., Havertown, Pa. (19083) ... OR
1967. Liachowitz, Claire H., Presidential Apts. (19131) ... PM
1955. Liberman, George E., 1900 Spruce St. (19103) ... ALR
1971. Lieberman, Daniel, 1127 Walnut St. (19107) ... P
1970. Liebman, Emil P., 2106 Spruce St. (19103) ... ALR
1968. Lief, Harold I., 2d Floor, 4025 Chestnut St. (19104) ... P
1969. Lightfoot, William P., Temple Univ. Hosp. (19140) ... S
1956. Likoff, William, 20 Conshohocken Rd., Bala-Cynwyd, Pa. (19004) ... I C
1962. Lilley, George W., Scott Paper Co. (19113) ... I OM
1940. Limberger, William A., 301 S. Church St., West Chester, Pa. (19380) ... I
1948. Lin, David Y. P., 2222 S. Broad St. (19145) ... S
1966. Lin, Paul M., The Benson, Suite 123, Jenkintown, Pa. (19046) ... S
1956. Lindquist, John N., 422 Sabine Ave., Wynnewood, Pa. (19096) ... I
1972. Linnemann, Roger E., 3508 Market St. (19104) ... R
1936. Lintgen, Charles, 1930 Chestnut St. (19103) ... OBG
1958. Lipshutz, Arthur, Willow Grove Ave. & Crittenden St. (19118) ... Pd PdA
1959. *Lipshutz, Herbert, 829 Spruce St. (19107) ... PL
1953. Lipsius, Edward I., 319 S. 16th St. (19103) ... OPH
1959. Little, Ralph B., 111 N. 49th St. (19139) ... P
1944. Livesey, Mary M., 1201 Bethlehem Pike, Flourtown, Pa. (19031) ... I C
1933. Long, Esmond R., Society Hill Towers, 23B, 220 Locust St. (19106) ... PATH

* S. Weir Mitchell Associate.

1951. Long, Joseph P., 1930 Chestnut St. (19103) ..... OBG
1935. Long, William L., Fitler & Milnor Sts. (19114) ..... PN
1931. Longaker, Edwin P., 41 E. Montgomery Ave., Ardmore, Pa. (19003) ..... ENT
1951. Lorber, Stanley H., Temple Univ. Hospital, 3401 N. Broad St. (19140) .... I GE
1961. Lorry, Ralph W., 1247 E. Luzerne St. (19124) ..... S
1960. Lovett, B. Frank, North Park Drive & Airport Highway, Pennsauken, N.J. (08109) ..... OBG
1963. Lubowitz, Richard M., 1245 Highland Ave., Abington, Pa. (19001) ..... OBG
1936. Lucchesi, Pascal Francis, 220 E. Mermaid Lane, House #151 (19118) ..... PH
1967. Luce, Cyril M., 102 W. Front St., Media, Pa. (19063) ..... OPH
1970. Lucente, Edward R., 1907 S. Broad St. (19148) ..... OBG
1972. Lucier, Alfred C., 30 Hampden Road, Upper Darby, Pa. (19082) ..... OPH
1939. Luongo, Romeo A., 2054 Locust St. (19103) ..... ALR
1951. Luscombe, Herbert A., 136 S. 16th St. (19102) ..... D
1952. Lutman, Frank C., 33 E. Chestnut Hill Ave. (19118) ..... OPH
1919. Lynch, Frank B., Jr., 809 Cambridge Apts., School House Lane (19144) ... PATH
1950. Lynch, J. Edward, Mercy Catholic Medical Center, Medical Sciences Bldg., Darby, Pa. (19023) ..... OBG
1953. Lyons, John W., 255 S. 17th St. (19103) ..... P
1965. McCabe, James L., Jr., Bryn Mawr Med. Bldg., Bryn Mawr, Pa. (19010) .. I
1932. *McCahey, James F., Wesley Manor, Jacksonville, Fla. (32223) ..... U S
1958. *McClenahan, John L., 39 East Chestnut Hill Ave. (19118) ..... R
1957. McConnell, Edward L., Jr., 2342 S. Broad St. (19145) ..... OBG
1934. McCouch, Grayson, P., R.D. #4, W. Chester, Pa. (19380) ..... NP RES
1962. McCracken, Stewart, 3701 N. Broad St. (19140) I
1938. McCrea, Lowrain E., 933 Remington Rd., Wynnewood, Pa. (19096) ..... U
1958. McCune, Wallace G., 5555 Wissahickon Ave. (19144) I
1942. McDonald, P. Robb, Lankenau Medical Bldg. (19151) ..... OPH
1953. McDonnell, William V., West Jersey Hospital, Camden, N.J. (08104) .... PATH
1952. McElroy, Robert C., 133 S. 36th St. (19104) ..... OBG
1970. McFadden, John F., 102 Wooden Bridge, Holland, Pa. (18966) ..... I C
1950. McFadden, William M., 1187 E. Washington Lane (19138) ..... Pd
1971. McGarry, Thomas F., 9301 Frankford Ave. (19114) ..... I C
1949. McGavic, John S., 1104 Montgomery Ave., Rosemont, Pa. (19010) ..... OPH
1970. McGeary, Joseph D., Fidelity Mutual Life Ins. Co., Parkway at Fairmount (19101) ..... INS
1945. McGee, Lemuel Clyde, Box 3879, Greenville, Wilmington, Del. (19807) I
1954. McGehee, Edward H., 33 E. Chestnut Hill Ave. (19118) ..... I HEMA
1952. McGlade, Thomas H., 514 Cooper St., Camden, N.J. (08102) ..... ALR
1966. McGrath, Raymond J., 6400 Dicks St. (19142) ..... ALR
1933. McLaughlin, James S., 1443 Cayuga St. (19140) ..... I A
1966. McMichael, Harrison, 524 Meadowbrook Circle, Wayne, Pa. (19087) ..... PATH
1924. McMillan, Thomas M., 2451 Mt. Island Drive, North, Mobile, Ala. (36606) I
1955. McStravog, Lawrence J., 5057 Sylvia Rd., Drexel Hill, Pa. (19026) ..... ALR
1954. MacFayden, Bruce V., 1801 J. F. Kennedy Blvd. (19103) ..... G
1964. Macht, Elmer L., Jr., York & Keith Roads, Abington, Pa. (19001) ..... OBG
1949. MacNeal, Perry Scott, 513 South Lenola Rd., Moorestown, N. J. (08057) .. I
1973. MacVaugh, Horace, III, 7145 Lafayette Ave., Fort Washington, Pa. (19034) ..... TS
1955. Macy, Dorothy, 5616 N. 45 St., Phoenix, Ariz. (85018) I
1957. Madow, Leo, 3300 Henry Ave. (19129) ..... P N
1970. Magee, John T., Bryn Mawr Hosp., Bryn Mawr, Pa. (19010) ..... I Adm
1967. Magee, Joseph H., 330 N. Princeton Ave., Swarthmore, Pa. (19081) I
1966. Maguire, Henry C., Jr., 7701 Burholme Ave., Fox Chase, Pa. (19111) ..... D

* S. Weir Mitchell Associate.

1952. Mahoney, J. Francis, 250 S. 18th St. (19103) ..... R
1969. Mahood, William H., 1245 Highland Ave., Abington, Pa. (19001) ..... GE I
1970. Maier, Willis P., 3401 N. Broad St. (19140) ..... S
1972. Makous, Norman, 330 S. 9th St. (19107) I
1969. Mallin, Aaron W., Rittenhouse Med. Center, 1900 Spruce St. (19103) ..... PN
1965. Mancall, Elliott L., 230 N. Broad St. (19102) ..... N
1959. Mandel, Martin M., Benson Manor, Township Line & Washington Lane, Jenkintown, Pa. (19046) ..... N
1968. Mandell, Morton S., 1319 W. Tabor Rd. (19141) ..... I C
1966. Manges, W. Bosley, 255 S. 17th St. (19103) ..... S
1954. Manges, Willis E., Methodist Hospital, Broad & Wolf Sts. (19148) ..... R
1971. Manko, Michael A., Lancaster & City Line (19151) I
1970. Manley, Donelson R., Wills Eye Hospital (19130) ..... OPH
1949. Manlove, Francis R., 500 Williamson Rd., Gladwyne, Pa. (19035) I
1960. Manning, Valentine R., 3336 Aldine St. (19136) ..... PL
1956. Manstein, George, 1351 Tabor Rd. (19141) ..... S PL
1969. Mansure, Frank T., 4601 Market St. (19139) ..... I INS
1969. Mansure, Patricia R., Penn Central R.R. Med. Office, 30th St. Station (19104) I
1953. Marbach, A. Herbert, 1307 Tabor Rd. (19141) ..... OBG
1948. *Marden, Philip Ayer, University Hospital, 36th & Spruce Sts. (19104) ..... ALR
1958. Marino, Daniel J., 422 East 22nd St., Chester, Pa. (19013) I
1966. Markind, Simon, Mercy Hosp., Auburn, N.Y. (13021) ..... PM
1969. Marks, Gerald, 255 S. 17th St. (19103) ..... S PR
1972. Marshak, Robert R., Univ. Penna. Sch. Vet. Med., New Bolten Cntr., Kennett Square, Pa. (19438) ..... DVM
1950. Marshall, E. Wayne, 907 Pine St. (19107) ..... I PUL
1968. Martin, John H., 3401 N. Broad St. (19140) ..... I RHEUM
1972. Martin, Samuel P., III, Dept. Community Med. HUP (19104) I
1951. *Martin, William L., 402 Holly Lane, Wynnewood, Pa. (19096) ..... S
1953. Marx, Halvey E., 76 Brennan Drive, Bryn Mawr, Pa. (19010) ..... PATH
1970. Mason, Daniel, 1500 Vine St. (19102) ..... I C
1972. Mastrangelo, Michael J., Amer. Oncologic Hosp., Central & Shelmire Aves. (19104) I
1966. Mastroianni, Luigi, Jr., University Hospital (19104) ..... OBG
1968. Mausner, Judith S., The Medical College of Pennsylvania (19129) ..... PrM
1951. Mayock, Robert L., 3600 Spruce St. (19104) ..... PUL
1958. Mays, Ralph Whiteman, 666 E. Penn St. (19144) ..... I C
1961. Mechanick, Philip, Univ. of Pa. Hosp. (19104) ..... P
1951. Medinger, Frederick G., 1941 Woodland Road, Abington, Pa. (19001) ..... S ONC
1959. Medoff, Joseph, Two Decker Sq., 22–24 City Ave. & Decker Blvd., Bala-Cynwyd, Pa. (19004) ..... I GE
1941. Mendell, Theodore H., Suite 1603, 1930 Chestnut St. (19103) I
1943. Meranze, David R., 229 W. Upsal St. (19119) ..... PATH
1954. Mertens-Roesler, Elizabeth, 2910 Woodpipe Lane (19129) ..... PATH
1955. Mervine, Thomas B., Medical Arts Bldg., Woodbury, N.J. (08096) ..... S
1959. Metzger, Harry N., 1815 Pine St. (19103) ..... I GE
1964. Meyer, Edward C., Fitzgerald Mercy Hospital, Darby, Pa. (19023) ..... S TS
1972. Michaelson, Thomas C., 3401 N. Broad St. (19140) I
1964. Michaile, Kenneth I., 1930 Chestnut St. (19103) ..... OPH
1971. Michon, Catherine A., 702 N. White Horse Pike & Wright Ave., Stratford, N.J. (08084) ..... OPH
1956. Miller, Bernard Joseph, Medical Office Bldg., 666 E. Penn St. (19144) ..... S
1939. Miller, Malcolm W., Lankenau Medical Bldg. (19151) ..... I A
1921. *Miller, T. Grier, 133 S. 36th St. (19104) I

* S. Weir Mitchell Associate.

1955. Miller, William H., Fitzgerald Mercy Hospital, Darby, Pa. (19023) ..... PATH
1952. *Mintz, S. S., 1930 Chestnut St. (19103) ..... I C
1963. Mishkin, Mark M., Univ. of Pa. Hospital (19104) ..... R
1952. Mitchell, Robert McNair, 807 Spruce St. (19107) ..... OBG
1959. *Mitterling, Robert C., Chestnut St. & Glendale Rd., Upper Darby, Pa. (19082) I
1967. Monheit, Richard S., Albert Einstein Medical Center, N.D. (19141) I
1970. Montgomery, Bruce B., 1930 Chestnut St. (19103) ..... OBG
1936. Montgomery, Hugh, 932 Merion Sq. Rd., Gladwyne, Pa. (19035) I
1936. *Montgomery, John B., 1930 Chestnut St. (19103) ..... OBG
1932. Montgomery, Thaddeus L., 2031 Locust St. (19103) ..... OBG
1935. *Moore, John Royal, 3701 N. Broad St. (19140) ..... OR
1947. Moore, Matthew Thibaud, 1813 Delancey Pl. (19103) ..... PN
1958. Moore, Samuel R., Jr., 1600 Arch St. (19101) ..... INS
1972. Moran, John F., Jr., 506 Walnut St. (19105) ..... OM
1958. Morani, Alma D., 3665 Midvale Ave. (19129) ..... S PL
1936. Morgan, David R., Franklin & Thompson St. (19122) .....
1945. Morris, I. Paul, 1939 W. Cheltenham Ave. (19117) ..... Pd
1969. Morris, Robert G., Jr., R.D. #4, Shadow Brook, Tunkhannock, Pa. (18657) ..... R
1972. Morse, Peter H., Scheie Inst., 51 N. 39th St. (19104) ..... OPH
1967. Moss, N. Henry, N. Medical Bldg., 1335–49 W. Tabor Rd. (19141) ..... S
1964. Most, William, 994 Haddon Ave., Collingswood, N.J. (08108) I
1971. Moulder, Peter V., 2500 N.W. 19 St., Gainesville, Fla. (32601) ..... S TS
1959. Moyer, John H., 230 N. Broad St. (19102) I
1941. *Mucklé, Craig Wright, 8016 Seminole Ave. (19118) ..... G
1973. Mudd, Emily Hartshorne, 734 Millbrook Lane, Haverford, Pa. (19041) .... PhD
1929. Mudd, Stuart, 734 Millbrook Rd., Haverford, Pa. (19041) ..... RES
1960. Mulberger, Robert D., 1930 Chestnut St. (19103) ..... OPH
1965. Muller, Otto, Fitzgerald-Mercy Hospital, Darby, Pa. (19023) ..... I C
1968. Murphey, Henry S., 3810 Oak Rd. (19129) ..... Adm ALR
1953. Murphy, Edward J., Bryn Mawr Medical Bldg., Bryn Mawr, Pa. (19010) .. OBG
1958. Murphy, John J., 3600 Spruce St. (19104) ..... U S
1959. Murray, Edwin N., 130 N. Broadway, Camden, N.J. (08102) C
1955. Murtagh, Frederick, Jr., 3401 N. Broad St. (19140) ..... NS
1972. Murto, Robert E., 433 Bellevue Ave., Trenton, N.J. (08618) ..... OPH
1973. Myers, Allen R., HUP, 3600 Spruce St. (19104) ..... ARTH Pd
1951. Myers, David, 3701 N. Broad St. (19140) ..... ALR
1969. Myers, Eugene N., Univ. of Pittsburgh, Dept. OTO, Pittsburgh, Pa. (15213) ..... ALR
1965. Myers, Richard N., 307 Lankenau Medical Bldg. (19151) ..... S
1955. Nachod, Grace R., 5501 Greene St. (19144) ..... OPH
1968. Naden, Randall S., Jr., 130 N. Broadway, Camden, N.J. (08102) ..... I C
1968. Nagel, Frank O., Jr., 37 S. 20th St. (19103) ..... OPH
1945. Naide, Meyer, 2034 Spruce St. (19103) I
1951. Naidoff, David, 3500 Tudor St. (19136) ..... OPH
1972. Nakhjavan, Fred K., York & Tabor Rds. (19141) ..... I C
1966. Nance, Maurice R., 1500 Spring Garden St. (19101) ..... Adm PHARM RES
1950. Nardone, Anthony A., 912 South 49th St. (19143) ..... OBG
1959. Neal, Hunter S., 460 Lankenau Medical Bldg. (19151) ..... S TS
1963. Nelson, Arthur D., 3400 N. Broad St. (19140) ..... PH PrM
1972. Nelson, Harry M., Jr., 1308 DeKalb St., Norristown, Pa. (19401) ..... S
1943. Nelson, Waldo E., 615 Moreno Rd., Narbeth, Pa. (19072) ..... Pd
1955. *Nemir, Paul, Jr., 19th & Lombard Sts. (19146) ..... S TS
1971. Nevyas, Herbert J., 1930 Chestnut St. (19103) ..... OPH

* S. Weir Mitchell Associate.

1970. Nicastro, Gennaro C., 3018 N. 25th St. (19132) ..... ALR
1970. Nicholas, Leslie, 255 S. 17th St. (19104) ..... D
1935. *Nicholson, Jesse Thompson, 419 S. 19th St. (19146) ..... OR
1960. Nicholson, John W., III, 115 Chestnut St., Moorestown, N.J. (08057) ..... OR
1947. Noone, Ernest L., R.D. #2, Box 336, Elverson, Chester Co., Pa. (19520) I
1954. Norris, Charles M., 3401 N. Broad St. (19140) ..... Pd
1938. *Norris, Robert F., 430 Colebrook Lane, Bryn Mawr, Pa. (19010) ..... ALR
1971. Oakey, Richard S., Jr., 419 E. 22 St., Chester, Pa. (19013) ..... PATH
1973. O'Brien, Joan A., 930 Paper Mill Rd. (19118) ..... DVM
1972. O'Connell, William A., 8708 Germantown Ave. (19118) ..... OBG
1971. Oels, Helen C., 223 Sumneytown, Pa. (18084) ..... PATH
1963. O'Hara, A. Edward, Jefferson Medical College Hospital (19107) ..... R
1973. Olen, Else, 247 St. Joseph's Way (19106) ..... PATH
1954. Olsen, Axel K., The Windsor Apts. (19103) ..... NS
1949. *O'Neill, James F., 1425 Woodland Rd., Rydal, Pa. (19046) ..... S TS
1947. Ornsteen, A. M., 2007 Delancey Pl. (19103) ..... PN
1973. Ostrum, Bernard J., 2412 N. 52 St. (19131) ..... R
1958. O'Sullivan, Ward D., Mercy Cath. Med. Center, Fitzgerald Mercy Hosp., Darby, Pa. (19023) ..... S
1955. Ottenberg, Donald J., Eagleville Hosp., Eagleville, Pa. (19408) I
1970. Ottenberg, Perry, 111 N. 49th St. (19139) ..... P
1961. Owen, Barbara J., Bryn Mawr Hospital, Bryn Mawr, Pa. (19010) ..... PATH
1949. *Padis, Nicholas, Lankenau Medical Bldg. (19151) I
1968. Padula, Richard T., 1025 Walnut St. (19107) ..... S TS
1971. Palmer, Louis H., Bryn Mawr Medical Bldg., Bryn Mawr, Pa. (19010) ..... S
1963. Parish, Benjamin D., Jr., 1261 Bethlehem Pike, Flourtown, Pa. (19031) ..... REH
1972. Parish, Lawrence, 1930 Chestnut St. (19103) ..... D
1945. Park, Felix Roman, 1980 Utica Sq., Tulsa, Okla. (74114) I
1973. Parr, Justin L., 1802 Delancey Pl. (19103) ..... PATH
1972. Patterson, Donald F., 3800 Spruce St. (19104) ..... DVM DSc
1952. Paxson, Newlin F., 245 N. Broad St. (19107) ..... OBG
1932. Payne, Franklin L., 240 Beech Hill Road, Wynnewood, Pa. (19096) ..... OBG
1954. Pearce, Alexander E., 1420 Race St. (19102) ..... S
1958. Pearce, Rowan C., Jr., 30 Washington Ave., E-Entry, Haddonfield, N.J. (08033) ..... ALR
1965. Pearlstine, Beatrice, 6219 N. 11th St. (19141) ..... I GE
1954. Pearson, Manuel M., 111 N. 49th St. (19139) ..... P
1967. Pechin, Sergius P., 1910 Garrett Rd., Lansdowne, Pa. (19050) ..... S
1930. *Pendergrass, Eugene P., Radiology Dept., University Hospital, 3400 Spruce St. (19104) ..... R
1953. Penneys, Raymond, 230 N. Broad St. (19102) I
1964. Perrin, George M., First Floor Mills Bldg., Philadelphia General Hospital, 34th & Curie Ave. (19104) ..... P
1940. Pessel, Johannes F., 224 West State St., Trenton, N.J. (08608) ..... I GE
1952. Peters, Michael, Fairhill Rd., Hatfield, Pa. (19440) C
1968. Peterson, Arthur L., 111 N. 49th St. (19139) ..... P ADM
1961. Peterson, Lysle H., Bockus Research Institute, 19th & Lombard Sts. (19146) C
1940. Pettit, Horace, 123 Kennedy Lane, Bryn Mawr, Pa. (19010) ..... A
1949. *Pettit, Mary DeWitt, 3300 Henry Ave. (19129) ..... OBG
1946. Pfeiffer, Mildred C. J., 358 Valley Rd., Merion, Pa. (19066) ..... ADM
1935. Phillips, Arthur W., Emlenton, Pa. (16373) ..... P
1961. Phillips, William A., 60 Meadowbrook Dr., Princeton, N.J. (08540) ..... P
1948. Pierson, Daniel B., Jr., 740 Beacon Lane, Merion, Pa. (19066) I

* S. Weir Mitchell Associate.

1964. Pierucci, Louis, Jr., Suite 303 Cooper Parkway West, N. Park Drive, Pennsauken, N.J. (08109) ..... S
1961. Pike, Anne H., Suite L-11 Stafford House, 5555 Wisshickon Ave. (19144) ..... OBG
1957. *Pilling, George Platt, IV, 2600 N. Lawrence St. (19133) ..... S Pd
1933. *Pillsbury, Donald M., Duhring Labs., University Hospital (19104) ..... D
1957. Platt, Ruth M., 441 Lyceum Ave. (19128) ..... FP
1951. Poinsard, Paul J., 2123 Delancey Place (19103) ..... P
1968. Polin, Edward B., 7810 Old York Rd. (19117) I
1937. Polk, David Stewart, Rosemont, Pa. (19010) ..... Pd
1967. Polk, Lewis D., 540 Municipal Service Bldg. (19107) ..... Pd PrM
1956. *Pontarelli, Domenic J., 1037 Great Springs Rd., Rosemont, Pa. (19010) ..... OBG
1953. Porreca, George A., 1843 S. Broad St. (19148) ..... OBG
1932. Porter, Roland De Lance, 3301 N.E. 5th Ave., Apt. 1205, Miami, Florida (33137) ..... OBG S
1951. Pote, Harry H., 103 E. Ridley Ave., Ridley Park, Pa. (19078) I
1958. Potter, H. Phelps, Jr., Paoli Memorial Hosp., Lincoln Hwy., Paoli, Pa. (19301) I
1951. *Pressman, Robert S., 170 W. Olney Ave. (19120) I
1965. Price, Joseph J., 36 Copley Road, Upper Darby, Pa. (19082) ..... OBG
1947. Prickett, John A., Warrington, Bucks County, Pa. (18976) ..... R
1931. Pryor, Charles Allen, 734 S. Latch's Lane, Merion Station, Pa. (19066) ..... ALR
1968. Qualls, Donald M., Lankenau Medical Bldg. (19151) ..... OR
1971. Quinn, Norman J., 1218 Valley Rd., Villanova, Pa. (19038) ..... Pd
1972. Rabson, Moses, 5609 N. Park Ave. (19141) ..... OR
1943. *Radbill, Samuel X., 7043 Elmwood Ave. (19142) ..... Pd
1953. Radbill, Sidney G., Wm. Penn House, 1919 Chestnut St. (19103) ..... OPH
1966. Raffensperger, Bruce W., 400 Bellaire Ave , Fort Washington, Pa (19034) ..... OBG
1953. Raffensperger, Edward C., 290 St. James Place (19106) ..... GE
1945. Rakoff, Abraham Edward, Apt. 601, 250 S. 18th St. (19103) ..... G
1953. Ralston, Edgar L., 3400 Spruce St. (19104) ..... OR
1931. Ramsey, Frank M., Lakeside Dr., Rt. 1, Mayfield, N.Y. (12117) .....
1968. Randall, Peter, Univ. of Pa. Hosp. (19104) ..... PL
1953. Ranieri, Tito A., 2320 S. Broad St. (19145) ..... S
1941. Rankin, Charles A., Ludlow & Heather Rd., Upper Darby, Pa. (19082) ..... OPH
1968. Rashkind, William L., Children's Hosp. (19146) ..... Pd PdC
1951. *Rathmell, Thomas K., 446 Bellevue Ave., Trenton, N.J. (08618) ..... PATH
1969. Rawnsley, Howard M., 3400 Spruce St. (19104) ..... PATH
1962. Raymond, F. Douglas, Jr., Bryn Mawr Medical Bldg., Bryn Mawr, Pa. (19010) I
1964. Raymond, Samuel, 711 Maloney Bldg., University Hospital, 36th & Spruce Sts. (19104) ..... PATH
1961. Read, William T., Jr., 110 Munn Lane, Cherry Hill, N.J. (08034) ..... PATH
1954. *Reagan, Lindley B., 601 Chester Ave., Moorestown, N.J. (08057) ..... S
1965. Reddy, John B., 330 S. 9th St. (19107) ..... ALR OPH
1960. Reed, Theodore P., Lankenau Medical Bldg. (19151) ..... OBG
1928. Reese, Warren S., 2118 Locust St. (19103) ..... OPH
1971. Reidenberg, Marcus M., 3420 N. Broad St. (19140) I
1964. Reinhard, John J., Jr., 335 Woodstown Road, Salem, N.J. (08079) ..... S TS
1956. Reishtein, William A., 16 Bancoyd Rd., Merion Station, Pa. (19066) ..... OBG
1963. Reisinger, Paul B., 855 Berkeley Ave., Trenton, N.J. (08618) ..... S OR
1970. Reivich, Martin, Dept. Neurology, HUP, 3400 Spruce St. (19104) ..... N
1969. Relman, Arnold S., 3600 Spruce St. (19104) I
1972. Resnick, Edward J., 3401 N. Broad St. (19140) ..... OR
1968. Rex, Eugene B., Lankenau Medical Bldg. (19151) ..... ALR

* S. Weir Mitchell Associate.

1945. *Rhoads, Jonathan E., Univ. of Pa. Hospital (19104) ..... S
1964. Rhoads, Rebecca M. P., 3374 Orange St., Hollywood, Florida (33021) ..... OPH PrM
1963. Rial, William Y., 111 Dartmouth Ave., Swarthmore, Pa. (19081) ..... PrM
1971. Richman, Morton W., 10101 Academy Rd. (19114) ..... OPH
1936. Ritter, Joseph A., 1034 Bryn Mawr Ave., Narbeth, Pa. (19072) ..... Pd
1954. *Roberts, Brooke, 3400 Spruce St. (19104) ..... S
1957. Roberts, Joan Mary, 4 W. Mt. Pleasant Ave. (19119) ..... OBG
1968. Roberts, John M., 8815 Germantown Ave. (19118) ..... S
1964. Robinson, James H., 5900 Spruce St. (19139) ..... S
1969. Robinson, Nathaniel M., 5229 Spruce St. (19139) I
1969. Rodgers, Robert A., Jr., Westwood Med. Center, King's Hwy. & Westwood Dr., Woodbury, N.J. (08096) ..... OBG
1960. Roeder, Paul H., Haverford Ave. & Westwood Lane, Overbrook Hills, Pa. (19051) ..... OBG
1969. Roediger, Paul M., 1245 Highland Ave., Abington, Pa. (19001) I
1955. *Rogers, Fred B., 3401 N. Broad St. (19140) I
1971. Rominger, C. Jules, Radiology Dept., 5301 Cedar Ave. (19143) ..... R
1951. *Ronis, Bernard J., 2106 Spruce St. (19103) ..... ALR
1971. Ronis, Max Lee, 2106 Spruce St. (19103) ..... ALR
1971. Rorke, Lucy B., 120 Chestnut St., Moorestown, N.J. (08057) ..... PATH
1973. Rosato, Ernest F., 750 Darby-Paoli Rd., Newtown Sq., Pa. (19073) ..... S
1969. Rosato, Francis E., 3400 Spruce St. (19104) ..... S
1948. Roscoe, Constantine R., 7226 Castor Ave. (19124) ..... Pd
1928. Rose, Edward, 426 Owen Rd., Wynnewood, Pa. (19096) I
1936. Rose, Elizabeth Kirk, 426 Owen Rd., Wynnewood, Pa. (19096) ..... Pd PH
1959. Rose, Isadore, 6000 W. Oxford St. (19151) I
1972. Rosenbaum, Jerry L., York and Tabor Rds. (19141) I
1965. Rosenberg, Hyman, 1555 Haddon Ave., Camden, N.J. (08103) I
1946. *Rosemond, George Parrott, 3401 N. Broad St. (19140) ..... S
1960. Rosenow, Edward C., Jr., American College of Physicians, 4200 Pine St. (19104) I
1948. Rothman, Maurice M., Kennedy House, Bay Terrace Apt. 14E, 1250 West Ave., Miami, Fla. (33139) ..... GE
1951. Rouse, George P., Jr., 2031 Locust St. (19103) I
1966. Rovner, Harold, 1930 Chestnut St. (19103) ..... S PR
1969. Rowland, Lewis P., G50 Administration Bldg., 3400 Srpuce St. (19104) ..... N
1952. Roxby, Bruce S., Temple Univ. Health Services, Broad and Montgomery (19122) I
1955. Roxby, John B., Jr., 215 Vassar Ave., Swarthmore, Pa. (19081) ..... I D
1949. Royster, Henry P., 888 Glenbrook Ave., Bryn Mawr, Pa. (19010) ..... S
1959. Rubin, Alan, 1905 Spruce St. (19103) ..... OBG
1952. Rubin, I. Edward, 255 S. 17th St. (19103) ..... OPH
1966. Rugart, Karl F., Penna. Hosp., 8th & Spruce Sts. (19107) ..... OBG
1947. Rush, Alexander, 330 S. 9th St. (19107) ..... GE I
1971. Rutberg, Franklin L., Stafford House, Wissahickon & Cheltenham Ave. (19144) ..... ALR
1963. Rutter, William A., 425 Wister Rd., Wynnewood, Pa. (19096) ..... P
1945. Rynes, Samuel E., 334 S. 21st St. (19103) ..... A
1965. Sachs, Marvin L., 3400 Spruce St. (19104) I
1952. Sain, Fletcher D., 1245 Highland Ave., Abington, Pa. (19001) ..... S
1970. Salim, Bozorgmehr, 651 Shellbank Lane, Rosemont, Pa. (19010) ..... P
1952. Salner, Nathan P., 6812 Castor Ave. (19124) ..... R
1952. Saltzman, Maurice, 2037 Spruce St. (19103) ..... ALR
1966. Samitz, M. H., 1715 Pine St. (19103) ..... D

* S. Weir Mitchell Associate.

1944. Sampson, David Alan, 726 Braeburn Lane, Penn Valley, Narbeth, Pa. (19072) ..... R
1964. Santangelo, Samuel C., 1941 Woodland Road, Abington, Pa. (19001) ..... OR
1972. Santore, Felice J., 108 Lankenau Med. Bldg. (19151) ..... ALR
1968. Sarin, Lov K., Lankenau Med. Bldg. (19151) ..... OPH
1950. Sarner, Joseph B., 289 Locust St. (19106) ..... PR
1967. Sattilaro, Anthony J., Apt. 2708, Wm. Penn House, 1919 Chestnut St. (19103) ..... ANES
1954. Savacool, J. Woodrow, 146 W. Tulpehocken St. (19144) ..... I PUL
1947. Sayen, John J., 3600 Spruce St. (19104) ..... I C
1969. Schaedler, Russell W., Jefferson Med. College (19107) ..... ADM RES
1971. Schamberg, Ira L., 7852 Montgomery Ave. (19117) ..... D
1942. *Scheie, Harold G., Scheie Eye Inst., 51 N. 39th St. (19104) ..... OPH
1929. Schenck, Harry P., 1235 Wyngate Rd., Wynnewood, Pa. (19096) ..... ALR
1966. Schless, Guy L., 330 South Ninth St. (19107) I
1945. Schlezinger, Nathan S., 255 S. 17th St. (19103) ..... PN
1961. Schlosser, Woodrow D., 3701 N. Broad St. (19140) ..... ALR
1971. Schmidt, William C., 223 Lancaster Ave., Devon, Pa. (19333) ..... FP
1958. Schnabel, Truman G., Jr., VA Hosp., University & Woodland Ave. (19104) . I
1957. Schnall, Nathan, 7310 Castor Ave. (19152) ..... OBG
1962. Schneider, Henry C., 4801 Penn St. (19124) ..... PR
1966. Schoenberg, Harry W., St. Louis Univ. Sch. Med., 1325 S. Grand Blvd. St. Louis, Mo. (63104) ..... S U
1973. Schor, Stanley, 536 Cedar Drive, Lafayette Hill, Pa. (19044) ..... Ph.D.
1970. Schott, Clifford E., Jr., Misericordia Hosp. (19143) ..... I C
1968. Schotz, Seymour, 51 N. 39th St. (19104) ..... ANES
1955. Schreader, Charles J., 8906 Atlantic Ave., Margate City, N.J. (08402) C
1952. Schulz, Norbert J., 106 W. Front St., Media, Pa. (19063) ..... S
1950. Schumann, Francis, 8815 Germantown Ave. (19118) ..... S
1971. Schwartz, Gordon F., 1025 Walnut St. (19107) ..... S
1948. Schwarz, Gabriel A., 133 S. 36th St. (19104) ..... N P
1962. Schwarz, Henry P., Philadelphia General Hospital (19104) ..... PATH
1955. Schwegman, Cletus W., Hospital of the University of Penna. (19104) ..... S
1973. Scimeca, Henry A., 88 Crestview Dr., Willingboro, N.J. (08046) ..... ALR
1966. Scott, J. Clifford, RFD #2, Box 215, Malvern, Pa. (19355) ..... P
1930. Scott, John Porter, Children's Hospital, 1740 Bainbridge St. (19146) .... Pd
1950. Scott, Michael, 3401 N. Broad St. (19140) ..... NS PN
1940. Scott, T. F. McNair, Children's Hospital, 1740 Bainbridge St. (19146) ..... Pd
1952. Seifer, Arthur F., 710 South Main St., Phoenixville, Pa. (19460) ..... ORTH
1958. Sellers, Alfred M., Hosp. of the Univ. of Pa. (19104) ..... I C
1968. Senior, John R., 54 Merbrook Lane, Merion Station, Pa. (19066) ..... GE
1969. Sewell, Edward M., 314 W. Carpenter Lane (19119) ..... Pd
1973. Seydel, H. Gunter, 1690 Old Welsh Rd., Huntingdon Valley, Pa. (19006) ... R
1967. Seyler, Raymond Q., 1600 Arch St. (19101) ..... INS
1972. Shaffer, Frank W., 1605 W. Main St., Norristown, Pa. (19401) ..... RES P
1973. Shapiro, Bernard, 417 Hidden River Rd., Penn Valley, Narberth, Pa. (19072) ..... RES NUC
1960. *Shannon, Gerard M., 8118 Bustleton Ave. (19115) ..... OPH
1963. Sharples, Wynne, 454 S. Ithan Ave., Villanova, Pa. (19085) ..... RES
1956. Shaw, Daniel L., Jr., 702 Knox Rd., Villanova, Pa. (19085) ..... RES
1963. *Shearburn, Edwin W., 306 Lankenau Medical Bldg. (19151) ..... S
1955. Schechter, Fred R., 2461 No. 54th St. (19131) .....
1954. Shelley, Walter B., 36th & Spruce Sts. (19104) ..... D
1955. Shenkin, Henry A., Episcopal Hospital (19125) ..... NS

* S. Weir Mitchell Associate.

1968. Sherk, Henry H., 2647 West Field Ave., Camden, N.J. (08105) ..... OR
1968. Sherry, Soi, Temple Univ. Health Center (19140) I
1956. Sherson, Jacob S., 405 Meadow Lane, Merion Station, Pa. (19066) ..... PUL
1958. Shipps, Hammell P., Route 130 & New Albany Rd., Cinnaminson, N.J. (08077) ..... G
1957. Shope, Edward Pierce Lentz, 807 Wilson Bldg., Camden, N.J. (08102) .... OPH
1946. Shoup, George Daniel, 121 W. Walnut Lane (19144) ..... U
1955. *Shubin, Harry, 1829 Pine St. (19103) ..... I ADM
1952. Shuman, Charles R., 3401 N. Broad St. (19140) I
1949. Sidlick, David M., Park Towne Place E., 2200 Benj. Franklin Pkwy. (19130) . D
1972. Sigel, Bernard, 3300 Henry Ave. (19129) ..... S
1969. Silberberg, Donald H., Univ. of Pa. Hosp. (19104) ..... N
1941. *Silcox, Louis E., Lankenau Medical Bldg. (19151) ..... ALR
1956. *Sillars, Charles H., Abington Memorial Hospital, Abington, Pa. (19001) ... R
1968. Silverio, John, Wyeth Labs., P. O. Box 8299 (19101) ..... Pd
1955. Silverstein, Alexander, 1829 Pine St. (19103) ..... PN
1971. Silverstein, Herbert, HUP, 36th & Spruce Sts. (19104) ..... ALR
1967. Simenhoff, Michael L., 1025 Walnut St. (19107) I
1961. Simmons, Vaughan P., The Fidelity Mutual Life Insurance Co., S. Penn Sq. (19101) ..... I INS
1954. Singmaster, Lawrence, 272 Cheswold Lane, Haverford, Pa. (19041) ..... S
1952. Skromak, Stanley J., 5108 Torresdale Ave. (19124) I
1969. Skversky, Norman J., 6810 Castor Ave. (19149) I
1967. Sloane, Norman G., 255 S. 17th St. (19103) I
1929. Smith, Austin T., 330 S. 9th St. (19107) ..... ALR
1964. Smith, Edgar C., 7100 Marshall Road, Upper Darby, Pa. (19082) I
1967. Smith, Kaighn, Lankenau Medical Bldg. (19151) ..... OBG
1933. Smith, Lauren Howe, 111 N. 49th St. (19139) ..... P
1967. Smith, Robert R., William H. Rorer, Inc., 500 Virginia Drive, Fort Washington, Pa. (19034) ..... PHARM
1964. Smyth, Murray G., Jr., 1710 Delancey Place (19103) ..... R
1968. Snagg, William, T., Cooper Hospital, Camden, N.J. (08103) ..... ADM
1951. Snape, William J., Cooper Hosp., Medical Arts Bldg., 5th Floor, 300 Stevens St., Camden, N.J. (08103) ..... GE
1972. Snow, James B., Jr., 198 Gibson Bldg., 3400 Spruce St. (19104) ..... P
1966. Snow, Laurence H., 3300 Henry Ave. (19129) ..... P
1958. Sodeman, William A., Suite 620, 116 S. 7th St. (19106) ..... I C
1961. Soffe, Alvin M., 1930 Chestnut St. (19103) ..... I C
1935. Sokoloff, Martin J., 255 S. 17th St. (19103) ..... PUL
1971. Solit, Robert W., 829 Spruce St. (19107) ..... S TS
1964. Soll, David B., 5001 Frankford Ave. (19124) ..... OPH
1940. Soloff, Louis A., 3401 N. Broad St. (19140) ..... I C
1944. Sommer, George N. J., Jr., 120 W. State St., Trenton, N.J. (08608) ..... TS
1952. Sones, Maurice, Mt. Airy Medical Bldg. (19119) I
1951. Sonneborn, Duane G., 1200 W. Erie Ave. (19124) I
1972. Soricelli, David A., 500 S. Broad St. (19146) ..... DDS
1928. *Spaeth, Edmund B., 1930 Chestnut St. (19103) ..... OPH PL
1966. Spaeth, George L., 1601 Spring Garden St. (19130) ..... OPH
1958. Spaeth, Philip G., 1930 Chestnut St. (19103) ..... OPH
1971. Spagna, Paschal M., Front & Lehigh Ave. (19125) ..... S TS
1972. Spaulding, Earle H., Dept. Microbiology, 3401 N. Broad St. (19140) ..... Ph.D.
1935. Spiegel, Ernest A., 6807 Lawnton Ave. (19126) ..... N
1961. *Spiegelman, Jay, Benson East Apt., Jenkintown, Pa. (19046) ..... A
1955. Spitz, Eugene B., 40-50 W. Front St., Media, Pa. (19063) ..... NS
1958. Splendido, Joseph A., 608 W. Cliveden (19119) ..... I C

* S. Weir Mitchell Associate.

1961. Stahlgren, LeRoy H., Episcopal Hospital, Front & Lehigh Ave. (19125) ... S
1960. Stainback, William C., Bryn Mawr Medical Bldg., Bryn Mawr, Pa. (19010) . S
1957. Stanley, Robert C. G., 2315 Edgemont Rd., Chester, Pa. (19013) ..... OBG
1968. Stapinski, Stanley M., 80 W. Main St., Glen Lyon, Pa. (18617) I
1927. Starr, Isaac, 505 Cresheim Valley Rd. (19118) C
1952. Stayman, Joseph W., Jr., 8815 Germantown Ave. (19118) ..... S TS
1945. Stecher, H. Armin, 1510 Darby Rd., Havertown, Pa. (19083) ..... FP PUL
1955. Steel, Howard H., 1526 Mt. Pleasant Rd., Villanova, Pa. (19085) ..... OR
1964. Stein, Donald B., Jr., 3000 Robin Lane, Havertown, Pa. (19083) ..... PATH
1946. Stein, Irvin, 1936 Spruce St. (19103) ..... OR
1966. Stein, Joseph M., 1507 Landmark One, Cherry Hill, N.J. (08034) I
1953. Stein, Raymond O., 269 S. 19th St. (19103) ..... OR
1966. Stein, Samuel C., 1930 Chestnut St. (19103) ..... I PUL
1968. Steinmetz, Charles G., III, 4606 Spruce St. (19139) ..... OPH
1951. Sterling, Julian A., 3505 S. Ocean Drive, Hollywood, Fla. (33020) ..... S
1972. Stetzer, John J., 33 E. Chestnut Hill Ave. (19118) ..... DDS
1948. Stevens, Lloyd W., Presbyterian-Univ. of Pa. Med. Center Bldg. 301, 3910 Powelton Ave. (19104) ..... S
1969. Stewart, W. Wayne, 1608 Walnut St. (19103) ..... OM
1967. Stool, Sylvan E., 1740 Bainbridge St. (19146) ..... ALR
1968. Storey, Patrick B., Graduate Hosp., 19th & Lombard St. (19146) I
1961. Strang, John E., 864 County Line Rd., Bryn Mawr, Pa. (19010) I
1973. Strauss, Richard E., 765 Arden Rd., Jenkintown, Pa. (19046) ..... D
1953. Strawbridge, Rendall R., Lankenau Medical Bldg. (19151) I
1953. Stroud, Morris W., 1175 Birmingham Rd, RD #5, West Chester, Pa. (19380) I
1960. *Strumia, Paul V., Bryn Mawr Hospital, Bryn Mawr, Pa. (19010) ..... PATH
1971. Stumpe, Alfred R., 3930 Chestnut St. (19104) ..... PrM
1973. Stupniker, Sonia, 1104 Valley Rd., Melrose Park, Pa. (19141) ..... A
1967. Stunkard, Albert J., Univ. of Pennsylvania (19104) ..... P
1951. *Sturgis, Katharine Boucot, 349 Wister Rd., Wynnewood, Pa. (19096) ..... PUL PrM
1927. Sturgis, Samuel Booth, 349 Wister Rd., Wynnewood, Pa. (19096) ..... FP
1971. Sugiura, Henry T., 51 N. 39th St. (19104) ..... PATH
1966. *Sullivan, Howard E., Jr., Bryn Mawr Medical Bldg., Bryn Mawr, Pa. (19010) I
1930. Sunderman, F. William, 1833 Delancey Place (19103) ..... I CP
1954. *Sussman, Marcel S., Wm. Penn House, 1919 Chestnut St. (19103) ..... OBG
1963. Sutliff, Frederick P., 1125 Woodbine Ave., Narberth, Pa. (19072) ..... OPH
1965. Sutnick, Alton I., 2135 St. James Place (19103) I
1968. Sweeney, Francis J., Jr., Jefferson Med. College (19107) I
1972. Sweterlitsch, Paul R., Suite 301, 1245 Highland Ave., Abington, Pa. (19001) ..... OR
1971. Syms, Charles A., 1246 E. Cheltenham Ave. (19124) I
1952. Talbot, Timothy R., Jr., 204 Booth Lane, Haverford, Pa. (19041) ..... I HEMA
1963. Tassman, William S., 187 E. Evergreen Ave. (19118) ..... OPH
1946. Tauber, Robert, 1600 Providence Blvd., Deltona, Florida (32763) ..... G
1952. Taylor, Ann Gray, 515 W. Chelten Ave. (19144) ..... OB
1960. Taylor, Daniel B., 2241 Federal St. (19146) ..... U
1969. Taylor, W. J. Russell, PGH, 34th and Curie Ave. (19104) ..... PHARM
1973. Templeton, Bryce, 213 Hardwicke Lane, Villanova, Pa. (19085) ..... P
1956. Templeton, John Y., III, 829 Spruce St. (19107) ..... S TS
1966. Teplick, Joseph G., 419 N. Sterling Rd. (19117) ..... R
1966. Terry, Luther L., Suite 2100, 465 L'Enfant Plaza West, Washington, D.C. (20024) ..... ADM
1951. Theodos, Peter A., 1930 Chestnut St. (19103) ..... PUL

* S. Weir Mitchell Associate.

1970. Thier, Samuel O., Rm. 570 Maloney Bldg., HUP, 3400 Spruce St. (19104) ... NEPH
1972. Thiessen, Joop W., 3508 Market St. (19104) ... R
1959. Thomas, Arthur H., 5240 Vine St. (19139) ... S
1946. Thomas, Carmen C., 1930 Chestnut St. (19103) ... D
1964. Thomas, John W., 5900 Spruce St. (19139) ... S
1970. Thompkins, Leonard J., Miscericordia Hosp. (19143) ... PATH
1952. Thompson, Charles M., 428 Penn Valley Rd., Narberth, Pa. (19072) ... I GE
1971. Thompson, Hartwell G., HUP, 3400 Spruce St. (19104) ... N
1927. Thorington, J. Monroe, Cambridge Apts., Wissahickon Ave. & School House Lane (19144) ... OPH
1973. Thorp, T. Ramsey, 7014 Clearview St. (19119) ... S
1967. Thorwarth, William T., 8835 Germantown Ave. (19118) ... R
1973. Tice, Linwood F., 322 Morrison Ave., Salem, N.J. (08079) ... DSc
1971. Tillman, Joseph M., Jr., 434 Lindley Avenue (19120) ... OPH
1954. Tindall, Dorothy D., 1930 Rittenhouse Sq. (19103) ... OPH
1966. Toland, Joseph J., N.E. Med. Center, Roosevelt Blvd. & Welsh Rd. (19114) ... OR
1935. Toland, Owen J., 336 Aubrey Rd., Wynnewood, Pa. (19096) ... OBG
1952. *Tondreau, Roderick L., 523 Old Gulph Rd., Bryn Mawr, Pa. (19010) ... R NUC
1971. Torg, Joseph S., 3401 N. Broad St. (19140) ... OR
1949. Tornay, Anthony S., 2038 Locust St. (19103) ... PN
1972. Tornetta, Frank J., Montgomery Hosp., Norristown, Pa. (19401) ... ANES
1966. Torrance, Edward G., 678 Burmont Rd., Drexel Hill, Pa. (19026) ... RES
1968. Tourtellotte, Charles D., 3400 N. Broad St. (19140) ... I RHEUM
1936. Towson, Charles Emory, 224 W. Washington Lane (19144) ... ALR
1955. Trimpi, Howard D., 501 N. 17th St., Allentown, Pa. (18104) ... PR
1954. Trommer, Philip R., 258 S. 18th St. (19103) ... I ARTH
1956. Troncelliti, Mario V., Pennsylvania Hospital (19107) ... ANES
1953. Tropea, Frank, Jr., 500 Mulberry Lane, Haverford, Pa. (19041) ... S
1947. Trueman, Robert H., 2101 Chestnut St. (19103) ... OPH
1954. Truitt, R. Marshall, Jr., 6400 Wissahickon Ave. (19119) ... I
1971. Tucker, John A., HUP, 3400 Spruce St. (19104) ... ALR
1966. Tucker, Gabriel F., Jr., 3401 N. Broad St. (19140) ... ALR
1959. Tuddenham, William J., Pennsylvania Hospital (19107) ... R
1938. Tuft, Louis, 1530 Locust St. (19102) ... I A
1964. Tulsky, Emanuel G., Abington Memorial Hospital, Abington, Pa. (19001) ... R NUC
1933. *Tumen, Henry J., 1830 Rittenhouse Square (19103) ... I GE
1938. Turman, Christopher M., 1245 Highland Ave., Abington, Pa. (19001) ... OBG
1959. Tyson, R. Robert, 3401 N. Broad St. (19140) ... S
1953. Ulin, Alexander W., 230 N. Broad St. (19102) ... S
1970. Urbach, Frederick, 3322 N. Broad St. (19140) ... D
1960. Uricchio, Joseph F., 245 N. Broad St. (19107) ... I
1950. Valdes-Dapena, Antonio, 214 Plush Mill Rd., Wallingford, Pa. (19086) ... PATH
1972. Valdes-Dapena, Marie A., St. Christopher's Hosp. for Children (19133) ... PATH
1958. Van den Noort, Gordon, 1245 Highland Ave., Abington, Pa. (19001) ... NS
1937. *Vander Veer, Joseph B., 106 Bryn Mawr Med. Bldg., Bryn Maw, Pa. (19010) ... C
1937. Van Loon, Emily Lois, 4705 Disston St. (19135) ... ALR
1960. Van Meter, Ralph H., 244 W. Main St., Moorestown, N.J. (08057) ... OBG
1933. *Vastine, Jacob H., 2nd, 267 Kent Rd., Wynnewood, Pa. (19096) ... R
1967. Vaughan, Victor C., III, 2600 N. Lawrence St. (19133) ... Pd A
1963. Vaughan, Arthur R., Jr., 5329 Rising Sun Ave. (19120) ... OPH
1958. Velkoff, Cyril L., 2100 Walnut St. (19103) ... S
1965. Viggiano, Louis X., 528 Brandymede Place, Rosemont, Pa. (19010) ... OPH
1972. Viner, Edward D., 8th & Delancey (19107) ... I HEMA
1952. Vischer, Thomas J., 5903 Green St. (19144) ... I

* S. Weir Mitchell Associate.

1940. Voegelin, Adrian W., 3002 Foxx Lane (19144) ..... OBG
1960. Wagenheim, Harry H., Apt. 1A9, 2401 Pennsylvania Ave. (19130) ..... P
1949. Wagner, Frederick B., Jr., 800 Chauncey Road, Narbeth, Pa. (19072) ..... S
1949. Wagner, Joseph A., 201 Highland Ave., Bryn Mawr, Pa. (19010) C
1938. Waldman, Joseph, 404 Meadowbrook Lane (19118) ..... OPH
1955. Waldron, Jerome M., Evergreen Towers, 8900 Roosevelt Blvd. (19115) I
1971. Walker, Barry R., 51 N. 39th St. (19104) I
1967. Waltzer, Frederick N., York & Keith Rds., Abington, Pa. (19001) ..... OPH
1973. Watson, Ulysses E., 3831 The Oak Road (19129) ..... P
1969. Waugh, Bascom S., 1882 S. 10th St., Camden, N.J. (08104) I
1967. Wendkos, Martin H., Black Hawk Apts., L-16, Lancaster Ave., Downington, Pa. (19335) I
1969. Weibel, Robert E., 1001 Pennsylvania Ave., Havertown, Pa. (19083) ..... Pd
1952. Weinstein, George L., 255 S. 17th St. (19103) ..... OBG
1950. Weiss, Sidney, 2037 Locust St. (19103) ..... OPH
1965. Weiss, William, Philadelphia General Hospital, 34th & Curie Ave. (19104) ..... PUL
1959. Wellenbach, Burton L., 215 Medical Arts, 1601 Walnut St. (19103) ..... OBG
1951. *Welty, John W., Montgomery Ave. & Owen Rd., Wynnewood, Pa. (19096) I
1955. Wendkos, Martin H., Black Hawk Apts., L-16, Lancaster Ave., Dowington, Pa. (19335) I
1962. Wentz, Clarkson, 51 N. 39 St. (19104) ..... R
1973. Werther, Raymond, 1317 Morris Rd., Wynnewood, Pa. (19096) ..... DDS
1959. West, Clifton F., Jr., 406 Lankenau Medical Bldg. (19151) ..... S
1960. Whiteley, William H., 1015 Chestnut St. (19107) ..... NS
1969. Whitman, Mark A., 5555 Wissahickon Ave. (19144) ..... Pd
1954. Wieder, Henry S., Jr., 829 Spruce St. (19107) ..... OR
1939. *Willauer, George, 6729 Greene St. (19144) ..... S TS
1969. Williams, James R., 5000 Woodland Ave. (19143) ..... P
1937. *Williams, John C., 512 Auburn Ave., Wyndmoor, Pa. (19118) ..... OR
1965. Williams, Kirkley R., Bryn Mawr Bldg., Bryn Mawr, Pa. (19010) ..... S
1968. Williams, Norman, Jefferson Med. College (19107) ..... OM
1950. Williams, R. G., 421 Kirk Lane, Media, Pa. (19063) ..... ANAT
1927. Williamson, Ernest G., 6353 Woodbine Ave. (19151) ..... S
1945. Wilson, John F., 2013 Delancey Place (19103) ..... DS
1949. Wilson, William W., 561 Fairthorne Ave. (19128) ..... PN
1971. Winegrad, Albert I., Cox Institute, Hosp. Univ. Penna. (19104) I
1957. Winkleman, N. William, Jr., 4141 Apalogen Rd. (19144) ..... PN
1963. Winston, Joseph M., Jeanes Hospital (19111) ..... R
1966. Wise, John S., 433 Bellevue Ave., Trenton, N.J. (08618) ..... S
1961. Wise, Robert I., 1025 Walnut St. (19107) I
1968. Witkowski, Joseph A., 3501 Ryan Ave. (19136) ..... DS
1953. Wohl, George T. Lankenau Hospital (19151) ..... R
1958. Woldow, Irving, Einstein Med. Center, York & Tabor Rds. (19141) ..... I HEMA
1958. Wolf, John H., 124 Walnut Lane (19144) ..... S
1944. Wolf, Lewis R., 3474 Frankford Ave. (19134) ..... OPH
1962. Wolferth, Charles C., Jr., 230 N. Broad St. (19102) ..... S
1964. Wolfson, Robert J., Suite 700, 1920 Chestnut St. (19103) ..... OPH ALR
1964. *Wolgin, William, 1512 Spruce St. (19102) ..... U
1957. Wolkowicz, Michael I., 2022 Spruce St. (19103) ..... OPH
1942. Wolman, Irving J., 7607 Woodlawn Ave. (19126) ..... Pd
1972. Woo, Zung-Pah, 8835 Germantown Ave. (11918) ..... PATH
1966. Wood, Alfred C., Jr., 6386 Church Rd. (19151) ..... P
1932. *Wood, Francis C., 3400 Spruce St. (19104) ..... I C
1973. Wood, James E., III, 823 Castlefinn Lane, Bryn Mawr, Pa. (19010) C
1944. Wood, H. Curtis, Jr., 7010 Lafayette Ave., Fort Washington, Pa. (19034) ..... OBG
1966. Wood, Margaret G., 3400 Spruce St. (19104) ..... D

* S. Weir Mitchell Associate.

1953. *Woodruff, Marston T., 4940 Penn St. (19124) ..... R
1969. Wouters, Freerk W., 864 County Line Rd., Bryn Mawr, Pa. (19010) ..... P
1960. Wurzel, Harold A., 3400 Spruce St. (19104) ..... I HEMA
1969. Yanoff, Myron, 3400 Spruce St. (19104) ..... OPH PATH
1964. Young, Alma L., 3343 W. Penn St. (19129) ..... OBG
1966. Young, Irving, Albert Einstein Medical Center, N.D. (19141) ..... PATH
1972. Zacks, Sumner I., 807 Spruce St. (19107) ..... PATH
1967. Zakreski, Matthew J., 8815 Germantown Ave. (19118) ..... OBG
1973. Zamostien, Bernard B., 1335 Tabor Road, Suite 303 (19141) ..... PrM
1961. Zanni, Anthony L., 111 N. 49th St. (19139) ..... P
1957. Zaslow, Jerry, 6735 Harbison Ave. (19149) ..... S
1955. Zatuchni, Jacob, Heart Station, PM Bldg., Episcopal Hosp. (19125) ..... I C
1946. Zeigerman, Joseph H., 2105 Spruce St. (19103) ..... OBG
1970. Zimmermann, Albert W., Jr., One Plymouth Mtg., Suite 505, Plymouth Mtg., Pa. (19462) ..... OPH
1968. Zimskind, Paul D., Jefferson Med. College (19107) ..... U
1949. Zintl, William J., 1016 Warrior Rd., Drexel Hill, Pa. (19026) ..... S
1956. Ziserman, Abraham J., 3450 S. Ocean Blvd., Palm Beach, Fla. (33480) ..... OBG
1962. Zubrow, Sidney N., 829 Spruce St. (19107) I
1933. Zulick, J. Donald, Foxcroft Sq., Apt. 101, Jenkintown, Pa. (19046) ..... R
1965. Zweiman, Burton, Univ. of Pa. Hospital (19104) ..... I A

Non-Resident Fellows

ELECTED SPECIALTY

1960. Ainsworth, Thomas H., Jr., 840 N. Lake Shore Drive, Chicago, Ill. (60611) .. S
1941. Aronson, Roland S., 9401 Byeforde Road, Kensington, Md. (20795) ..... PATH
1954. Austin, George M., Loma Linda Univ. Med. Sch. Hosp., Loma Linda, Calif. (92354) ..... N S
1942. Bachman, Carl, 1824 Camino Verde Apt. A, Walnut Creek, Calif. (94596) ...
1958. Ballinger, Walter F., II, Washington Univ. Sch. of Med., 4960 Audubon Ave., St. Louis, Mo. (63110) ..... S
1955. Beckfield, William J., Luther Hospital, 310 Chestnut St., Eau Claire, Wisconsin (54701) ..... PATH
1949. *Beecham, Clayton T., Geisinger Medical Center, Danville, Pa. (17821) ..... OBG
1932. Behney, Charles A., P. O. Box 4256, San Jose Branch, Bisbee, Arizona (85603) ..... OBG
1942. Behrend, Albert, Cyprus Community Hosp., 600 S.W. 3rd St., Pompano Beach, Fla. (30060) ..... S
1968. Benenson, Abram S., Univ. of Kentucky College of Med., Lexington, Ky. (40506) ..... PrM
1970. Berry, Robert E., Bellevue at Jefferson St., Roanoke, Va. (24014) ..... S TS
1955. Blank, Harvey, P.O. Box 4875, Miami, Florida (33152) ..... D
1921. Borzell, Francis F., R. D. 4, Box 4310, Browns Mills, N.J. (08015) ..... P
1937. Braceland, Francis J., The Institute of Living, 200 Retreat Ave., Hartford, Conn. (06103) ..... RES
1936. Brown, Clark E., S. Pamet Rd., Truro, Mass. (02666) ..... S
1948. Brown, Robert B., Box 62, Kill Devil Hills, N.C. (27948) ..... OBG
1952. Bumgardner, Heath D., 13 S. Main St., Cape May Court House, N.J. (08210) I
1953. Burbridge, J. Raymond, 163 Nassau St., Princeton, N.J. (08540) .....
1962. Burney, Leroy E., 40 Wall St., N.Y., N.Y. (10005) ..... PH
1931. Cantarow, Abraham, Bldg. 31, Rm. 10A-49, Nat'l. Cancer Institute, NIH, Bethesda, Md. (20014) .....

* S. Weir Mitchell Associate.

1948. Chapman, John P., Calle Fray Junipero Serra 26, Palma de Mallorca, Balearic Islands, Spain .....
1950. Chapple, Charles C., 8517 Indian Hills Drive, Omaha, Neb. (68114) .....Pd
1941. Cheleden, John, 1012 Volusia Ave., Daytona Beach, Fla. (32014) .....PR
1930. Clarke, Francis Mann, 116 New St., New Brunswick, N.J. (08901) .....S
1926. Clerf, Louis H., 5575-8th Ave., North, St. Petersburg, Fla. (33705) .....ALR
1964. Cohen, Sheldon G., 309 S. Franklin St., Wilkes-Barre, Pa. (18702) .....A C
1969. Collins, James A., Geisinger Med. Center, Danville, Pa. (17821) I
1972. Copeland, James E., 4610 9th Place, Vero Beach, Fla. (32960) .....
1968. Cortes, Felix M., Calle Monserrate E-10, Quintas de la Monserrate Ponce, Puerto Rico (00731) .....I C
1959. Cowan, John S., 535 N. Dearborn St., Chicago, Ill. (60610) I
1960. Cowley, Allen W., Sr., 1919 N. Front St., Harrisburg, Pa. (17102) C
1967. Cox, J. William, 2906 N. Kensington St., Arlington, Va. (22207) .....I C
1968. Crichlow, Robert W., Dartmouth College, Hanover, N.H. (03755) .....S
1972. Cummings, Nancy Boucot, 2811 35 St., N.W., Washington, D.C. (20007) ...NEPH
1941. Cuttle, Tracy D., 6006 Wood Drive, Oakland, Calif., (94611) I
1959. Dannenberg, Arthur M., Jr., Johns Hopkins School of Hygiene, 615 N. Wolfe St., Baltimore, Md. (21205) .....PATH
1970. Davis, Charles M., Jr., 674 W. View Dr., Morgantown, W. Va. (26506) .....
1937. Davis, Perk Lee, 419 S.E. Third St., Deerfield Beach, Florida (33441) .....N
1947. Dehne, Theodore L., Lake Paupac Club, Greentown, Pa. (18426) .....P
1954. Deitrick, John E., 69 Rockledge Rd., Bronxville, N.Y. (10708) I
1965. Delaney, William E., III, St. Vincent's Hosp., 170 W. 12th St., N.Y.C. (10011) .....PATH
1968. Denton, Robert, Univ. Calif. Med. Sch., Davis, Calif. (95616) .....ANES Pd
1956. Dietrich, Herbert J., Jr., The Manor, Yarnton, Oxfordshire, Eng. .....ALR
1941. Dixon, Harold M., R.D. #3, Cool Springs Rd., Indiana, Pa. (15701) .....PATH ADM
1962. Dorman, Philip J., 151 Ridgemont Rd., Grosse Pointe Farms, Mich. (48236) .I
1961. Duane, Thomas D., Bedminster, Pa. (18910) .....OPH
1959. Durgin, Bernice Elise, 221 N. Allegheny St., Bellefont, Pa. (16823) .....
1947. Durkin, John K., 49 Woodcroft Rd., Havertown, Pa. (19083) I
1955. Edwards, Margaret Hay, 800 4th St., S.W., Washington, D.C. (20024) I
1953. Eisenberg, Isadore J., 2806 Green St., Harrisburg, Pa. (17110) .....OPH
1949. Elkinton, J. Russell, Fairfield-Old Church Rd., Colwall, Malvern, England.
1951. Ellis, Mackinnon, Kelkinny, RFD #4, Jonesboro, Tenn. (37659) .....
1957. **Errion, Arthur Robbins, 359 Essex St., Salem, Mass. (01970) I
1951. Ervin, Carl E., 1525 Cedar Cliff Dr., Camp Hill, Pa. (17011) I
1952. Flinn, Lewis B., 1306 Broom St., Wilmington, Del. (19806) I
1964. French, Gordon N., Far Hills, N.J. (07931) .....
1940. Fry, Kenneth E., 621 University St., Walla Walla, Washington (99362) .....S PH
1947. Gaskill, Herbert S., 480 S. Marion St., Denver, Colo. (80209) .....D
1931. Gilman, Robert Louis, Cheyney, Pa. (19319) .....D
1968. Glenney, Wilton R., 302 Mahantonga St., Pottsville, Pa. (17901) I
1954. Godfrey, Ellwood W., Princeton Hospital, Princeton, N.J. (08540) .....R
1928. Gordon, Burgess L., 1550 Lake Shore Dr., Chicago, Illinois (60610) I
1955. Greenstein, Raphael H., 1404 Valley View Dr., Blacksburg, Va. (24060) I
1952. Grieco, Reynold M., 2 W. 4th St., Williamsport, Pa. (17701) .....PR
1934. Griffith, John Q., Jr., 6 North Fredericksburg Ave., Margate, N.J. (08402) .I
1952. Gross, Elmer R., 1102 West St., Wilmington, Del. (19801) .....D
1933. Gruber, Charles M., 1313 College Ave., Redlands, Calif. (92373) .....RES
1951. Hafkenschiel, Joseph H., Jr., 380 Golden Oak Drive, Portola Valley, Calif. (94025) I
1935. Haines, Harlan F., 231 N. Pine St., Seaford, Del. (19973) I
1939. Hamblock, Leonard C., 617 Fair Winds Drive, Fair Winds Condominium, Nokomis, Florida (33555) .....OBG

** Military service.

1959. Hampton, Louis J., 300 Highland Ave., Hanover, Pa. (17331) ..... ANES
1969. Hanson, Stephen M., ... PATH
1966. Harrington, Edwin D., 720 Stanwick Rd., Moorestown, N.J. (18057) ..... Pd
1963. Harris, Charles, P.O. Box 721, Island Heights, N.J. (08732) .....
1955. Harris, John H., 1301-A N. Second St., Harrisburg, Pa. (17102) ..... R
1965. Harris, John H., Jr., Carlisle Hospital, Carlisle, Pa. (17013) ..... R
1936. Hatch, Lerleen Clement, 7546 E. Mariposa Dr., Scottsdale, Ariz. (85251) ..
1928. Hayman, Joseph M., Jr., 3504 E. Scarborough Rd., Cleveland Hts., Ohio (44118) ..... OR
1964. Heath, Robert D., The Geisinger Med. Center, Danville, Pa. (17821) ..... ALR
1946. Hendrickson, Frank O., 108 Norfolk Rd., Jupiter, Florida (33458) I
1955. Hills, Arthur G., 3303 River Rd., Toledo, Ohio (43614) I
1933. Hitzrot, Lewis H., 161 Patton Ave., Princeton, N.J. (08540) ..... R
1939. Hodes, Philip J., 1700 N.W. 10th Ave., Miami, Fla. (33136) ..... P
1969. Hollender, Marc H., Vanderbilt Univ. Hosp., Nashville, Tenn. (37203) .... PATH
1950. Horn, Robert C., Henry Ford Hospital, Detroit, Mich. (48202) I
1953. Imber, Irving, 428 Walnut St., Reading, Pa. (19601) ..... S
1958. Impink, Robert R., 405 Oley St., Reading, Pa. (19601) ..... S
1960. Jenson, William K., Desert Hosp., 1151 N. Via Miraleste, Palm Springs, Calif. (92262) ..... S
1952. Jonas, Karl C., 916 19th St., N.W., Washington, D.C. (20006) ..... S
1955. Jordan, Claus G., 175 E. Brown St., E. Stroudsburg, Pa. (18301) ..... S
1961. Joyner, Claude R., 320 E. North Ave., Pittsburgh, Pa. (15212) .....
1957. Kane, Sydney H., 88 Valley Rd., Berkeley Hts., N.J. (07922) ..... RES
1956. Keffer, William H., 413 Oley St., Reading, Pa. (19601) I
1947. Kelchner, Clyde H., 1125 Turner St., Allentown, Pa. (18102) I
1969. *Kitchen, James G., II, The Mohican, Pocono Lake, P. (18347) ..... FP
1954. LaMotte, William O., Jr., 1303 Delaware Ave., Wilmington, Del. (19806) . OPH
1963. Lang, Leonard P., Box 1168, Delaware Dr., Wilmington, Del. (19899) I
1943. Leopold, Irving H., The Mount Sinai Hospital, 100th St. & 5th Ave., New York, N.Y. (10029) ..... OPH
1952. Levan, John B., 2800 N.E. 30th Ave., Apt. 11-D, Lighthouse Pt., Fla. (33064) C
1960. Lewis, David H., Torild Wulffsgatan 37,413 19 Goteborg, Sweden .....
1964. Leymaster, Glen R., AMA, 535 N. Dearborn St., Chicago, Ill. (60610) ..... PH
1949. Lhamon, William T., The New York Hospital, 525 E. 68th St., New York, N.Y. (10021) ..... P
1954. Light, John J. B., 25 N. 9th St., Lebanon, Pa. (17042) ..... R
1954. Lindenmuth, Woodrow W., Yale-New Haven Hosp., PO Box 1001, New Haven, Conn. (06504) ..... S
1948. Livingood, Clarence S., Henry Ford Hospital, Detroit, Mich. (48202) ..... D
1932. *Lukens, Francis D. W., Apt. 45 Neville House, 552 N. Neville St., Pittsburgh, Pa. (15213) I
1965. McCarty, Daniel J., Jr., University of Chicago, Chicago, Ill. (60637) I
1935. McClenahan, William U., 629 Bayview Dr., Sarasota, Fla. (33577) .....
1948. McLaughlin, John T., 655 N. Central Ave., Glendale, Calif. (91203) ..... S
1950. Mackmull, Gulden, 12995 S.W. King Richard Dr., King City, Tigard, Oregon (97223) I
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Today's Concept of Schizophrenia[1]

In the Light of Clinical Experience, Changing Theories, Changing Theoretical Errors and of Research Progress of 75 Years' Duration

By MANFRED BLEULER, M.D.[2]

INTRODUCTION

Treatment and care for schizophrenics and research of schizophrenic derangements were very much neglected for centuries. When my father Eugen Bleuler started to study his schizophrenic patients in very close personal touch with them in the early '90s of the last century and when he continued his work in the first decade of this century assisted by his resident C. G. Jung and in close cooperation with Emil Kraepelin and Sigmund Freud, both Jung and my father had no financial assistance whatsoever. They did their research work on their own account in their leisure time after their daily hard work, and the hospitals refused to spend the same amount of money for the nursing of schizophrenics as for the nursing of physical patients.

Ever since then, this situation has much improved, particularly in the United States. However, it is depressing to see how frequently care and treatment of schizophrenics is still neglected in many countries and many hospitals all over the world.

Under these circumstances, it is a particular merit of great significance that the families Doerr and Brodsky have organized regular lectures, exclusively designed to further the knowledge of schizophrenia and the treatment of schizophrenic patients.

I want to thank them very cordially for their very precious help and encouragement to students of schizophrenia and to schizophrenic patients and their families.

[1] Susan Doerr Brodsky Lecture I, The College of Physicians of Philadelphia, 6 June 1973. This program was presented jointly by The College of Physicians and Philadelphia Psychiatric Society. The speaker was introduced by O. Eugene Baum, M.D., President of Philadelphia Psychiatric Society.

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PREJUDICES IN RESEARCH ON SCHIZOPHRENIA

If we try to survey research on schizophrenia within the last 75 years, we are impressed by how much it was influenced by mere speculations and preconceived opinions. And this was the case in a period during which research in medicine was supposed to be objective, to consider facts and facts alone and to be qualified by the standard of exact natural science. We must admit, however, that with regard to schizophrenia speculations and prejudices were easy to form and it was tempting to misunderstand them as empirical facts or as well-conceived and logical conclusions.

One of the first prejudices has its origin in everyday experience with the schizophrenic catastrophe: confronted with schizophrenic alienation many people are frightened as if they were faced with a horrible, ghostly and unearthly phenomenon. Anyone with a warm heart despairs when he has before him a man, supposed to be as he is, and as anyone is, but whose thoughts, whose feelings, whose moods and whose activity cannot be understood and seem to be enigmatic and threatening. The impression arises that such an unprecedented, unheard-of alteration of a human being originates in spheres different from everyday happenings, that schizophrenic alienation must be explained by astonishing and unprecedented circumstances. It is just this impression on which Jaspers' philosophy is based, a philosophy which has played a great role in German psychiatry for half a century and which has not been very useful for therapeutic practice. Jaspers felt that thinking and feeling as regards the life of a schizophrenic, understanding his ideas and his experiences in a similar way to those of healthy men, was absolutely impossible.

The consequences of such a belief are far-reaching: it is difficult to find the roots of a disease if we look for them in an unknown world, as we are on the earth and in our world! If we try to find any particular, occult and mystical background for schizophrenia, we are inclined to overlook what we can see and what we really know: we see that the future schizophrenic suffers from many personal problems and has difficulties in adapting himself to the contrasts and ambivalence in his inner life. We also can observe how he spoils and intoxicates his human environment by his disharmonious and difficult personality and how the unfavorable human environment acts more and more as a stress in reverse back on to him. We also know that the course of the disease can be, in many cases, very much influenced in an unfavorable or favorable direction by the patient's relationship with parents and friends. And we know for certain and with many exact details that, among the relatives of schizophrenics, schizophrenia and schizoid personality types are much more frequent than in the average population. If we take into consideration what we know, and if we don't pay much attention to what we don't know, we must consider the family background of schizophrenics, both with regard to heredity and to the influence of the patient's experiences with his relatives, and we must consider the personality development of the patient as it is marked by the interrelationship of his own influence on his parents and friends and the influence of his parents and friends on him. But even psychiatrists hesitated to draw conclusions about the origin of such an awful catastrophe as a schizophrenic breakdown from these everyday observations. It was one of the great merits of Adolf Meyer and American psychiatry to remind international psychiatry to build up the theories of

schizophrenia on what we can see and not on dogmatic ideas of a mysterious process.

Another difficulty for the progress of research was due to the assumption that schizophrenia is a specific disease and therefore it must have a unique specific cause. However, a unique and specific cause has not been discovered, neither a specific brain process, nor a specific metabolic disturbance, nor a specific inherited gene nor a specific psychological stress situation. For a long while one hesitated to consider the possibility of a multitude of quite unspecific morbid factors, the individual combination of which might be the background on which schizophrenia develops.

But there were many other prejudices with an unhappy influence on the research on schizophrenia. At the beginning of this century psychiatrists were very much impressed by the brilliant progress of biological sciences due to the rediscovery of Mendel's laws of heredity. They were possessed by the idea that schizophrenia was an inherited disease due to a single mutation of a single gene and that the hereditary transmission followed a simple Mendelian rule. They forgot that simple Mendelian transmission of peculiar qualities and of diseases is only possible if they develop independently of the whole somatic or personal development, and that the development of schizophrenia is very much interwoven with the personal development as a whole. They also forgot that no psychological trait or mere psychopathological derangement is known which is transmitted according to a simple Mendelian law of heredity, just because any psychological trait of a man always develops in close connection with the personality as a whole. They also forgot that the Mendelian theory of schizophrenia was already shown to be wrong in the light of the fact that schizophrenia is a very frequent disease, but that, on the other hand, the fertility of schizophrenics is reduced to less than half of the norm and that, for this reason, the assumption of a Mendelian heredity would presuppose an unlikely high mutation rate. They even forgot that the hereditary background of many qualities of animals and of men is not given by a single gene, but by many genes together and that the harmony of the different hereditary dispositions, their integration, is of decisive importance. In spite of all these facts, many researchers continued to look for a Mendelian law as the background of schizophrenia. They were neither discouraged by theoretical arguments against the Mendelian transmission of schizophrenia nor by their failure in finding the Mendelian law they sought. We can state today: nothing—except the belief that there should exist one—speaks in favor of a simple Mendelian hereditary transmission of schizophrenia.

One is inclined to think that knowledge of brain pathology must arise from visible, apparent findings, which can be demonstrated to other research workers by the discoverer. In the history of research on schizophrenia, on the other hand, morbid brain processes were frequently claimed to exist, although they had not been seen by anyone, or in spite of the fact that the claims of positive findings of one pathologist were never confirmed by others.

Errors of metabolism should only be admitted as valid if they have been demonstrated in laboratories, but an error of metabolism has often been claimed to be the background of schizophrenia without sufficient laboratory findings. It was even argued that inborn errors of metabolism were the reason for mental retardation and that therefore they might also be the reason for schizophrenia. But mental retarda-

tion has really nothing to do with schizophrenia.

It is time, however, to stop my critical remarks and the story of errors and to discuss the most important positive results of experience and research with schizophrenics.

WHAT ARE THE PRIMARY SYMPTOMS OF SCHIZOPHRENIA?

I shall start with some considerations of the psychopathology. A first step towards the understanding of schizophrenic symptoms was the distinction of primary and secondary symptoms. Such a distinction was used in somatic medicine: decalcification of the bone, for instance, is a primary symptom of osteomalacia; deformation and fractures of the bones as a result of mechanical forces on the decalcified bones are secondary symptoms. As long as the nature of schizophrenia in itself remained enigmatic, an attempt was made to explain at least some symptoms—the secondary ones as reactions of a morbid personality to environmental influence. This endeavor proved to be very successful: more and more of the symptoms could be understood as a somatic or psychologic consequence of as yet enigmatic primary symptoms. What was considered by many earlier authors as a somatic sign of schizophrenia proved to be a consequence of stress, of excitation, of exsiccation, of malnutrition and bad hygiene. This was the case for hematological and circulatory changes, for alterations of the pupillary reactions, for altered functions of the endocrine glands, for lesions of the liver and so on. Today, we have even reason to assume that fatal catatonia, death in the most severe catatonic excitement, is a natural death from exhaustion, exsiccation, pulmonary complications, pyelitis, thrombophlebitis or decubitus, and not, as has been assumed, the result of an undiscovered specific physical schizophrenic process. The muscular catatonic symptoms are not due, as has been assumed, to metabolic disturbances in the muscles, but reflect the psychological tensions and contradictions of the patients. Many psychopathologic symptoms were shown to be due to bad nursing and particularly to isolation and restraint, such as untidy habits, many forms of aggression and of mutism. Delusions, illusions and hallucinations can be psychodynamically understood as reactions of a morbid personality to personal unbearable worries and tensions. And what was considered some decades ago as the most characteristic and the primary expression of the disease, the mental deterioration, is partially understood today as a reaction of the patient to bad nursing and can be essentially influenced by therapy.

While we recognize today a great many of the schizophrenic symptoms as being of a secondary nature, the next question proved to be much more difficult to answer. I mean the question: What symptoms are the primary symptoms of schizophrenia or are close to the primary ones? The question is still open to discussion. I think, however, that we are starting to guess the answer: primary in the origin of schizophrenia seems not to be a single symptom, but rather a personal attitude, a way of life. It is characterized by the impossibility—or unwillingness—to live with all the tensions arising from diverging emotional trends, from contradictory wishes, longings and fears, from contradictory feelings with regard to other men. In connection with such a lack of adaptation to tensions in the inner life and of the inner life with reality, the patient creates a fantastic picture of a world of his own, a world in which he can live with all his ambivalence and contradictory tendencies and emotions, in which love and hate, fear and hope may

exist together. In such a world he is rid of the necessity to repress one feeling or one impulse in favor of a contradictory one. He rids himself of the need to concentrate his energies towards realistic, consistent goals. *Such a splitting of the personality and such autism are probably the primary symptoms of schizophrenia.*

Both are connected with each other; they can even be considered as two aspects of the same way of life: a split, disharmonic, torn personality has difficulties in adapting to reality and calls for the creation of a fantastic world, and is, therefore, the background of autism. On the other hand, retiring from reality and from the struggle for realistic aims, facilitates occupation with the ambitendencies and dysharmonies of the soul. In autism, the realistic activity, the stress of real life loses its harmonizing influence on the inner divergent tendencies and on mobilizing the psychic forces and on concentrating them in one direction.

In the light of psychopathologic, psychoanalytic and phenomenological studies, we can see nowadays almost all schizophrenic symptoms as the consequence of the autistic withdrawal from reality and the splitting of the psychologic life. The dissociation of speech and thought was considered for a while as a primary syndrome. Careful clinical study of schizophrenics demonstrates, however, that even this dissociation is very much dependent upon the autistic tendencies: we can observe every day that dissociation is severe when schizophrenics refuse contact with us and retire into autism, while it disappears and is replaced by clear and logical thinking when the patients want to be understood and contacted.

The search for primary symptoms in schizophrenia is of great theoretical and practical importance. If, for instance, incoherence of association was considered to be a primary psychopathologic symptom, one was inclined to look for a cerebral lesion, since somatic primary disturbance such as incoherence is often seen in cerebral patients. If we consider an exaggerated ambivalence and autism as a primary psychopathological syndrome, we are more inclined to acknowledge the psychopathologic development as essential, and the search for primary somatic lesions seems less promising, as ambitendence* and autism (in a much milder form of course) are frequent in people without somatic trouble.

It is not only anxiety when faced by psychological difficulties which thrusts the patient into his autistic withdrawal. Many other emotions, which are less discussed than anxiety in this connection, may play the same role, such as anger and spite or just longing for rest, relaxation and happiness.

All this—autism and splitting as primary phenomena in schizophrenia—has been described by many authors. I think, however, that one aspect of schizophrenic autism has not been considered as much as it ought to be, an aspect which is very encouraging for our therapeutic work: autism mainly means withdrawal from reality. But even autistic withdrawal—like any attitude of the schizophrenic (and perhaps of every human being)—includes an opposite tendency: astonishingly enough, the tendency to get again in touch with others, and even in a more intimate, more honest, more natural way than is usual in our civilisation. In his autism, the schizophrenic demonstrates himself

* The term ambitendence is derived from the term ambivalence: while ambivalence means contradictory emotional evaluation of an experience or a memory, ambitendence means contradictory trends for activity. If a patient hopes for marriage and fears marriage at the same time, he is ambivalent. If at the same time he is aggressive and courteous to his partner, his actions might be called ambitendent.

to others just as he is, in his unsolved ambitendencies, in his distress, in his helplessness, in his split existence. He presents his split existence. He presents his nude personality with great honesty. In doing so he feels a longing, a vague desire to get closer to the heart of others. He longs for a human community of a more cordial and natural kind than exists in our social establishment. In close contact with schizophrenics, we recognize an appeal which may be expressed in a simplified way, as follows: "Please do take me as I am, in all my weakness; I remain a human being; don't mind my craziness too much." We are greatly impressed by such a longing as seen in the look of many schizophrenics. Even more than the evil, malicious, paranoid look, quite another look is characteristic of them: a look in which sadness, resignation, bitterness are mixed, but also an appeal for acceptance and understanding. A similar signal is the frequent fine and touching smile even in very severe psychotics. At times, the ardent desire for stronger and better human contacts of the schizophrenic is difficult to deal with and makes therapy hard: this happens when the patients try to test the truthfulness of the therapist's interest and friendship in asking for erotic or even sexual contacts. But this, as a rule, can be overcome. The desire of the schizophrenic for contact even during his withdrawal, the fact that in some way the withdrawal in itself is a sign of such a longing, certainly is a good background for psychotherapy. Becoming aware of this longing is a great encouragement for the therapist to continue his work in spite of all the difficulties he may encounter.

THE LONG-TERM COURSE OF SCHIZOPHRENIA

I now want to discuss the *course*, particularly the *long course* over decades, of the schizophrenic psychosis. It was one of the main topics of my personal research. Discussing the course of schizophrenia, I must mention what I mean by this expression. I mean a real psychosis, and I am excluding from it borderline cases who could be described just as well as originals, schizoids, psychopaths or neurotics. Patients I diagnose as schizophrenics would be diagnosed the same way by the great majority of psychiatrists all over the world, while I would not diagnose as schizophrenics many patients so diagnosed by other psychiatrists. If, in the light of my studies, the prognosis of schizophrenia is much more hopeful than was considered formerly, this is certainly not due to a broader handling of the diagnosis. Quite on the contrary, each of the patients I have included in my statistics has gone through very severe psychotic phases.

To a large degree, the course of schizophrenia can be influenced by good or poor therapy and nursing, by relationship with the parents, by social conditions of various kinds. As far as physicians of our team in Zürich and I myself could observe, the distribution of different courses and outcomes of schizophrenia in some African societies differs from their distributions in our Western culture: very acute catatonic excitement, with complete recovery or fatal termination, forms a much greater proportion of schizophrenic psychoses than in Western countries. The dependence of the course of schizophrenia on the social situation of the patient—his friendliness or hostility towards his parents, his associates, towards the magicians and ghosts and sorcerers he believes in—is easy to see, much easier than the dependence on the course of human interrelationships in our culture. Even in small Switzerland differences have been described, by Hermann Rorschach for instance, in the course of

schizophrenia: excited paranoid episodes are more frequent in the northeastern parts of Switzerland than in the canton of Bern, where quite chronic catatonias are more frequently seen.

I could confirm by statistics what has been the impression of many psychiatrists who have treated schizophrenics for several decades: an outstanding observation is the disappearance of a course which was frequently seen and very much feared a century ago—schizophrenic psychoses with very acute outbreak in young patients immediately followed by a chronic severe psychosis, by complete deterioration as it was called formerly, without any remission. Milder chronic conditions have become more frequent than more severe chronic conditions. A course in phasic episodes with good remission has become more frequent than before, and so on.

The death of a person who played an important role in the life of a patient, such as father, mother, husband or wife, may be followed by an impairment or an improvement of the patient's psychosis. It is frequently an impairment, if the patient has been entirely dependent on the deceased and has accepted this dependency with his whole heart; it is on the contrary frequently an improvement if the attitude of the patient to the deceased was ambivalent, if he hated his own dependency and sought and needed it at the same time.

However, as far as we know, the effect of therapeutic or social influences, of any influences, on the course of the psychosis is limited: as the acute episodes are more or less under therapeutic control, the chronic development of schizophrenic psychoses is not. Its frequency does not seem to decrease even under the most modern therapy, as far as can be demonstrated by statistics. Nor do we know any society in which schizophrenia does not occur and does not develop in most different ways, in all the ways we know from our experience in western countries.

The most important finding of modern research with regard to the long course of schizophrenia seems to me the statement: *on an average, schizophrenia shows no more change for the worse after a duration of five years, but rather a tendency to improve.* The old assumption that schizophrenia is, as a rule, a progressive disease, which leads with increased age to more and more severe dementia, is quite wrong. Twenty, 25 and more years after the onset of the psychosis the proportion of recovered to improved and to not improved patients remains the same as five years after onset. This statement is just as valid if we take hospitalization, earning capacity or the general psychiatric impression as a criterion. After the fifth year of the psychosis about one-fourth of the schizophrenics are still hospitalized and three-fourths are not. The one-fourth remaining hospitalized, however, does not always consist of the same patients. Many patients are hospitalized for a certain time, discharged and later readmitted. What remains stable is the proportion of hospitalized patients to non-hospitalized, while the condition of a single patient may be unstable. I shall select only very few figures from my statistics on the social condition of schizophrenics decades after onset of a disease: 5, 10, 20 and 30 years after their first hospitalization, about half of the patients live outside hospitals without social assistance or medical treatment and only about 10% live permanently in hospital wards for severe or moderately severe patients. As seen by an overall psychiatric evaluation 20 to 40 years after the onset of the psychosis, a quarter of the patients still develop transitory acute episodes of the psychosis, and they again improve or recover from them. These patients never reach a long-standing stable condition.

Stability, however, is reached some years after onset by more than half, nearly three-fourths of schizophrenics. Between a fourth and a third of these stable conditions are definite recoveries. All these figures are at least valid for the conditions in Switzerland in the middle of this century.

If we now consider the so-called stable severe conditions of chronic patients, of the patients with chronic psychoses which were considered as deteriorations, two new observations are contradictory to older assumptions: firstly, the observation that many patients still show a tendency to improve even after many years of so-called dementia. Some of them start to speak normally on certain occasions, while for many years they had hardly uttered a single understandable phrase. Others behave suddenly in a normal way on vacation, during hospital entertainments or when danger threatens life as in many psychiatric hospitals during the war or in old hospitals during epidemics of typhoid fever. In very rare cases, severe chronic schizophrenics may even entirely recover after they were sick for more than ten years. And the second observation: chronic schizophrenics, even when considered to be completely deteriorated, remain alive, work on their image of the world in a creative way, remain sensitive to what is going on. Kraepelin, already, described that a schizophrenic never loses his memory and that his elementary perception remains intact. Later on it was discovered that discernment, the ability to reason and to think logically, remains intact and is not lost, but only hidden behind the autistic attitudes of schizophrenics. It is a new experience that human feelings, emotionality, the most intimate affective life is also not extinguished, as was frequently thought, but may be elicited during a skilled and longstanding psychotherapy of schizophrenics. In short: the healthy psychic life may be hidden in the chronic schizophrenic, but it goes on and on and is never extinguished.

FAMILY STUDIES

I now want to discuss some results of the modern studies of *the families* of schizophrenics. Time allows me to pick out only a few problems. I can neither speak of the well-known results of twin investigation or the results of the determination of the frequency of psychoses in various relatives of schizophrenics.

I should like first to criticize a very frequent type of approach to the problem of the unhappy influence of fathers, mothers and siblings on the future patient. It was usual to consider only the psychodynamics of the patient and to neglect entirely the psychodynamics of the parent. While the influence of father and mother on the patients was carefully studied, the influence of the patient on his parents was frequently overlooked. Such a one-sided approach to the problem has much to do with the unlucky designation "schizophrenogenic mother." Many descriptions presented such a mother's personality—her domineering attitude, her claims to form the child according to her own rigid ideas and not allowing him to be an independent individual, her lack of warm motherly love poorly compensated by overfeeding and spoiling the child, or her erratic and ambivalent expressions—as something stable, acting constantly on the development of the child. This is wrong. The future patient and later on the patient has a very marked influence on the parent and not only the contrary is true. We have frequently seen, for instance, the development of psychosomatic diseases under the stress of the care for a schizophrenic son or daughter. We have also observed how bitterness,

resignation and rigidity grew under the same stress.

If we study former descriptions of the so-called schizophrenogenic mother's influence on her child, we could easily obtain the impression that the mother has a very firm personality and does not herself change and develop under the influence of her human surrounding. Such an impression is wrong. The mother can develop to show an exceptionally warm and motherly attitude under such a stress, or her personality may on the contrary become more and more rigid, demanding, domineering and egocentric.

If one is aware of all the stress and worries many mothers of schizophrenics have to bear, one hesitates to classify them simply as schizophrenogenic. To be sure, such a label is meant as a mere diagnostic label by psychiatrists; for the mothers, however, and for the patients, such a designation is understood as an accusation and an insult. It favors feelings of guilt, which are certainly neither helpful to the patients nor the family and which do not facilitate the therapeutic influences of the physician to the family. It is also unjustified. We must remember: even the most difficult of these mothers can show at times and with part of their character the best aspects of motherhood, but the child has often made it too difficult to become a mother in the favorable sense.

A new research result concerns the children of schizophrenics: according to Kallmann, about 15% of them are predestined to become schizophrenic, and I was depressed to find in my statistics nearly the same number. With regard to the frequency of psychopathy of these children, however, I came to very different conclusions from Kallmann and some other earlier authors: I had to classify fewer children as schizoid and psychopathic than they did. According to the earlier authors, only about one third of these children could be expected to remain normal and to live a fulfilled and social life. In my experience, however, nearly three quarters of these children are healthy, remain healthy and are by no means psychopathic. The reason for such a different statistical result stems from the difference of the relationship of the former investigator and myself to these children and their families: I was the doctor treating these children, I knew them well and often played the role of a family doctor. In such a position I could evaluate the terrible stress in which these children had to live and I could often understand their peculiar behavior as a normal reaction to such a stress. Former investigators had collected information only about the behavior peculiarities of these children and not about their living conditions. When they were described, for instance, as timid, retiring, seclusive and moody, they diagnosed a psychopathic personality and frequently considered it as due to heredity. I knew many similar children, but I also knew, for instance, that the mother of one of them isolated him carefully from any contact with other children, that she even tried to keep him away from school and that she warned him constantly against delusional persecutors. This child was a healthy child under stressful conditions, and not an inborn psychopath, and he did well as he grew up.

The majority of these children who were peculiar under the care of a schizophrenic parent fight their way towards a good social position in life. Of the 138 children of schizophrenics in one of my statistics, whose life I could systematically follow, 120 reached a professional level corresponding to their family tradition and their education or even higher. Eighty-four of the 120 of these children who were married are

happy in their marriages.

If one can be much more optimistic with regard to the future mental health of children of schizophrenics, one is deeply depressed by their suffering in connection with their father's or mother's morbid behavior. They suffer, as a rule, quietly, without complaining to anybody, and their suffering is frequently overlooked. I think it is a noble and important vocation for a psychiatrist to care for the living conditions of his patients' children, to advise the family, and to ask for the help of social agencies or of the child psychiatrist, when necessary.

TREATMENT OF SCHIZOPHRENIA

With regard to the *therapy of schizophrenics*, I want to summarize only what seems to be essential.

Many most different therapeutic techniques have proved to be successful in some cases, unsuccessful in other cases. If we survey the failures and successes of the most different somatic, psychological and social treatments, not only some months, but many years after their application, we must come to the conclusion: no specific therapeutic technique for schizophrenia exists. About the same results can be reached with very different technical procedures. There is no therapeutic technique that could not be replaced by a quite different one. And any therapy which is efficient in many cases of schizophrenia is also efficient in many other conditions of psychic stress, in other psychoses or in just any emotional disturbances. We can formulate our experience as follows: just as no specific etiology for schizophrenia exists, there is no specific treatment.

Any treatment may be effective for a schizophrenic if it aims successfully at one, two or all the three following: to make the patient a member of an active community, or to confront him surprisingly with great responsibilities and the necessity to fight against dangers, or to calm him down if excited. It is of secondary importance what technique is chosen in order to reach these aims.

If you study the usual treatments of schizophrenics, you will always find that they include either the introduction into an active human community or shocking or calming. The community the schizophrenic has to be introduced into may be that of the patient with his psychiatrist, or it may be a group of patients and nurses in the same ward. In other cases, the family acts as the therapeutic group. Physical complications or somatic treatment—insulin treatment, for instance—arouses at times a particularly helpful relationship between patient, nurse and doctor. The activity of the group may be of the most different nature: in some cases it is the psychotherapeutic conversation; in others a more conventional conversation is sufficient; in many cases serious work is indicated; in others, the organization of leisure time and of entertainment is effective.

Somatic shock is not the only and probably not the best kind of shock therapy. A similar or better influence can be exercised, for instance, by giving the patient unexpected responsibilities, by changing his environment, or by appropriate interpretation in the sense of direct analysis.

Regularity in the day's schedule, the stable and mature kind of reaction of nurses and doctors to the patient's excitement, may be just as effective tranquilizers as tranquilizing drugs.

What is effective in the treatment of schizophrenics is also effective in the development of the healthy: clear and steady personal relations, activity in accordance with one's talents, interests

and strength, sudden confrontations with new responsibilities or even dangers and—at times—rest and relaxation. Exactly the same influences which mark the ego, the personality, and which restrain prelogical, unrealistic, disordered and autistic mental life from overflowing, from babyhood on to adult life, are effective in the treatment of schizophrenics.

Ladies and Gentlemen,

If you ask me what in my opinion are the most outstanding results of research on schizophrenia which we need in order to get an idea of the nature of the psychosis, I would enumerate the following:

Most schizophrenic symptoms can be explained as physical and psychological reactions to a more primary disturbance: it consists of autism and overwhelming ambitendencies, a severe splitting of the psychic life. Such a split ego and an autistic attitude are dependent on each other: the split ego evokes autism, and autism favors the coexistence of diverging tendencies.

Ambitendence and diverging emotions belong to the nature of man, but in schizophrenics they are more marked than usual. A tendency to withdraw into autism when faced with difficulties with oneself or with the outside world is also inherent in human nature. Such an autism in schizophrenics, however, is much more marked, so much, that adaptation to reality and to other people becomes impossible. The schizophrenic, driven by anxiety, by spite, by longing for happiness, retires into a world he creates for himself, in which he can live with all his psychological conflicts. The healthy man also withdraws at times into an unrealistic, autistic world, but he knows how to separate his autistic life from the everyday life in which he adapts himself to reality.

While we can get to a psychodynamic understanding of schizophrenia, we are far from recognizing a somatic disease as the primary disturbance of schizophrenics; nor must we forget a very important everyday experience when we discuss the origin of schizophrenia: somatic patients, and particularly cerebral and endocrine patients, are as a rule not schizophrenic; and in schizophrenics, as a rule, no somatic trouble has been discovered, in particular, no cerebral and no endocrine disease.

We know from psychotherapeutic experience that the reaction to unhappy life experiences plays a great role in the development towards schizophrenia. Up to now, however, we cannot assert that psychodynamic considerations alone explain schizophrenic developments without unfavorable heredity. Nobody has discovered that psychological stress in the life history of schizophrenics is of a specific nature and of another type from stress situations which many people can stand without becoming schizophrenic. For this and for many other reasons we must also assume a hereditary background for schizophrenia. Certainly schizophrenia is not due to a single or very few genes transmitted from generation to generation according to the Mendelian laws. Neither have we reason to think that schizophrenia is due to a demonstrable error of metabolism. Most probably the hereditary background of schizophrenia consists in a disharmony of different dispositions for the personality development. They are a background of the increased ambitendencies.

Hereditary dispositions and reactions to environmental stress are interwoven in the development of schizophrenia. By his personal disposition, the future schizophrenic spoils his relationship with others. And the disrupted and ambitendent relationships with others disturbs in a feedback his personal

development.

The long course of schizophrenia is different from the course of degenerative progressive brain processes: on the average, from the fifth year after onset onwards, the psychosis no longer progresses, but improvements occur frequently even after many years of suffering. In the schizophrenic psychosis the healthy psychic life is never destroyed, but hidden behind the autistic withdrawal into a fantastic and creative life.

The effective therapy of schizophrenia acts with the same forces which naturally secure the development of the personality.

Today, therefore, it seems probable that the development of schizophrenia goes on in the human psychic life, in the spheres and dimensions, the somatic background of which we are unable to perceive, in the same spheres and dimensions in which the neurotic, the psychopathic and the normal personality develops under the interwoven influences of inherited dispositions and life experience. It is possible that schizophrenic developments follow those pathways far remote from any understood and perceptible somatic process. This certainly does not mean that schizophrenia is identical with neuroses or psychopathic derangements. It is very different, but on account of its social aspects and not on account of a particular somatic or a very enigmatic and mysterious background.

Such a conception of the nature of schizophrenia may be quite wrong. It is possible that it will be shown to be wrong by some great future discovery. However, we don't live in the future. Until we have no further knowledge we must, as Adolf Meyer taught, take seriously what we do know. And the assumption of the nature of schizophrenia formed by the facts we know is helpful when we want to help schizophrenics and their families: the relatives of schizophrenics should no longer suffer from the idea that their hereditary dispositions are degenerated, that they are themselves—as was said in earlier decades—tainted with a hereditary burden. Their hereditary dispositions are not morbid, but combined in an unfavorable way. And we must not regard the schizophrenic himself as someone completely altered by a degenerative disease who has become an alien, a man deprived of human intelligence, emotions and genius. We can again see in him someone as we are, a brother, who has broken down because of the same difficulties we have to struggle with: our divergent tendencies, our unharmonious soul and the temptation to retire from reality in anxiety, spite and an unrealistic hope for happiness, in an autistic attitude.

And what seems to me most hopeful: we must no longer fear that the usual therapy of schizophrenics is only a symptomatic therapy not directed against an unknown primary morbid process. Quite the contrary: the therapy which has proved effective is directed against the primary, the main disturbance of schizophrenics—against the splitting of mental life and against autism. This knowledge may help us to fulfill our therapeutic duties to schizophrenics with greater hope, greater zeal and greater enthusiasm than at one time, when schizophrenia was considered to be due to an undiscovered, mystical somatic process and our therapeutic work was thought to be provisional and hardly worthwhile.

Introduction of Manfred Bleuler, M.D., for Honorary Fellowship[1]

By ROBERT E. JONES, M.D.

Doctor Sturgis, Fellows of the College, and guests:

I have the privilege of introducing for Honorary Fellowship Professor Manfred Bleuler, director emeritus of the Bürgholzli Clinic and professor of psychiatry of the University of Zürich in Switzerland.

The full credentials of this outstanding physician—who has practiced family medicine in an Alpine village, who received some of his psychiatric training in the United States, who has published numerous books and more than 200 articles on psychiatric subjects with emphasis on endocrinological studies of schizophrenia, who has been esteemed throughout the world for his encyclopedic knowledge of schizophrenia—will be described by Dr. O. Gerald Baum when he introduces the first Susan Doerr Brodsky Lecturer. Among his many other distinctions, Professor Bleuler will have the distinction of being the first psychiatrist to become an Honorary Fellow of this 186-year-old College. He will join a small band of only 30 psychiatrists out of 1400 Fellows in the College.

As you know, in the United States one-half of all hospital beds are mental hospital beds. Of these, one-half are filled by people with schizophrenia. The fact that one-fourth of our nation's hospital beds are occupied by people with this illness, the fact that the illness strikes during the most productive years of life, and the fact that it tends to be a chronic condition marring the lives of those who suffer from it, distressing their families, and burdening society with great cost to support them—these facts make schizophrenia one of our major medical problems.[2] The Federal government recently estimated the annual direct plus indirect cost of schizophrenia in the United States for the two to three million Americans carrying the diagnosis at approximately 14 billion dollars.[3]

One name stands above all others in the field of schizophrenia, the name of Bleuler. It was Eugen Bleuler who coined the word "schizophrenia" and in 1911 published the definitive work on the subject, which Gregory Zilboorg called "the classic work of twentieth century psychiatry." His efforts have been carried on by his son, Manfred Bleuler, who has been a scholar and thinker on the subject of schizophrenia as well as a physician and friend to many schizophrenic people. So in presenting Manfred Bleuler for Honorary Fellowship, we wish to honor a family that has devoted almost a century to the study of this major illness and that has brought knowledge and hope to combat the despair which many have felt about schizophrenia.

If it is possible to do so, we would like, by honoring this man, to honor the

[1] Read at the meeting for scientific business, The College of Physicians of Philadelphia, 6 June 1973.

[2] Jackson, D. J.: *The Etiology of Schizophrenia*. Basic Books, New York, 1960, p. 3.

[3] Mosher, L. R. and Feinsilver, D.: *Special Report: Schizophrenia*. National Institute of Mental Health Publication No. 72-9007. Washington, D. C., U. S. Government Printing Office, 1971.

Fig. 1. A photograph of Professor Manfred Bleuler (1903-), taken when he was seventy years old.

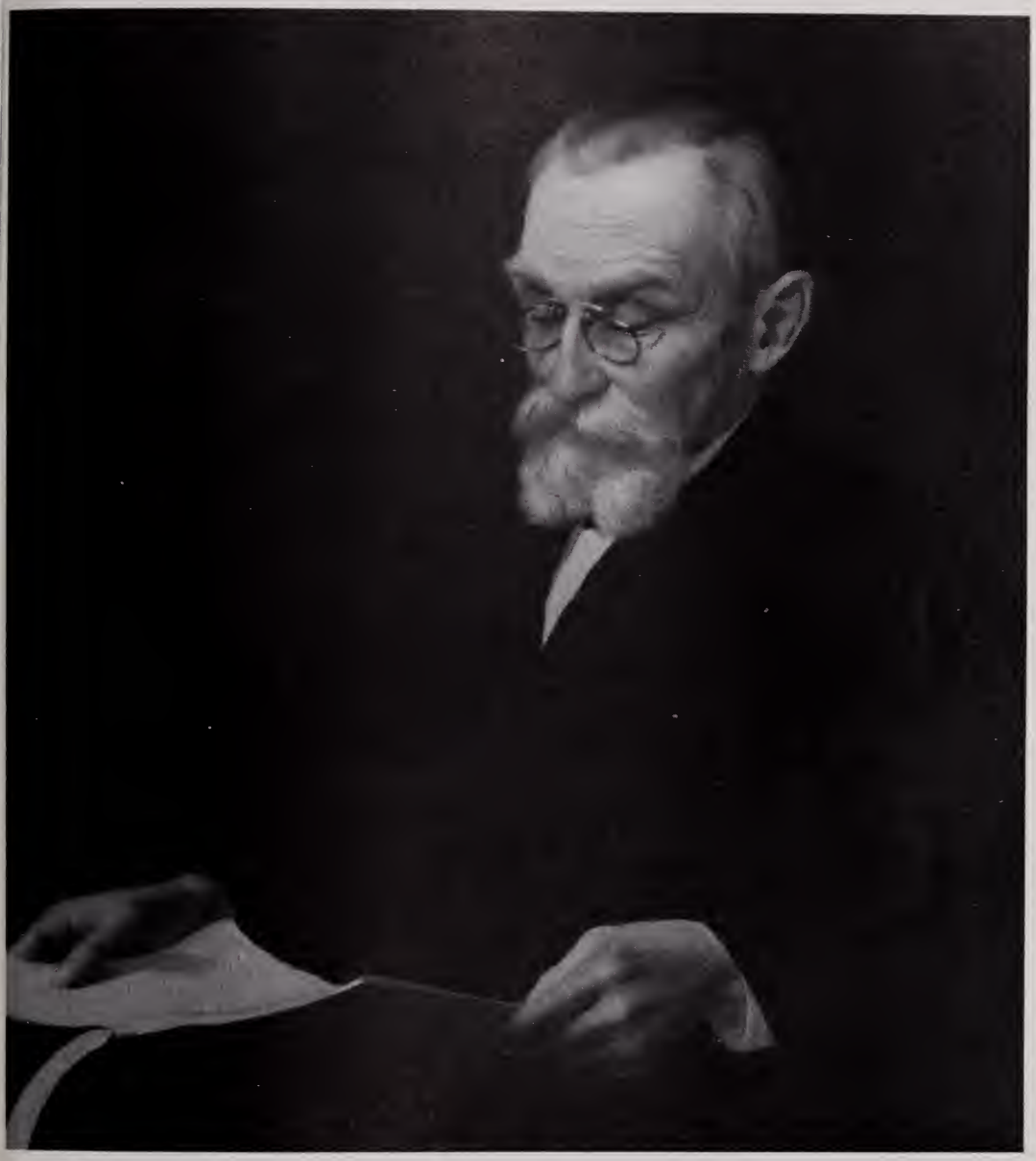

Fig. 2. A photograph of an oil painting of Professor Eugen Bleuler (1857-1939), painted when he was seventy years old. Father and son both served as Professor of Psychiatry at the University of Zürich.

people who experience schizophrenia, who comprise from 1 to 3% of our population, who because of the stresses which our society imposes on their fragile constitutions, are forced to withdraw, to isolate themselves from us.

We wish to honor the families of these patients, who have so much to tell us about the development of the illness and about what might help to alleviate it.

And we wish to honor all those who labor to improve the lot of schizophrenic people—the doctors and nurses, social workers and activities therapists—all who offer themselves as human beings for these people to relate to.

Professor Bleuler, then, represents to schizophrenic people, to their families, to us physicians, and to society, a hope that this major illness will someday be understood and conquered.

For these reasons, I am delighted, Dr. Sturgis, to present to you on behalf of the Censors and the Council of the College, Professor Manfred Bleuler as Honorary Fellow.

Postscript

After his return to Switzerland, Professor Bleuler sent as a gift to The College of Physicians a memento of his father, Eugen Bleuler. The gift consists of two 3 x 5" cards.

The first card contains notes written in shorthand, described by Professor Bleuler as an ancient shorthand which few people today can read. Professor Bleuler wrote: "During all his professional life, my father had a pocketful of these cards. During his ward rounds and during conversations with his patients or immediately afterwards, he made notes. On this card are notes in regard to grandiose ideas of an alcoholic patient together with some remarks for a lecture on alcoholic psychoses. The material for his book, Dementia praecox oder die Gruppe der Schizophrenien, *originated from similar notes."*

The second card is a typewritten summary of a book reviewed by Eugen Bleuler. Professor Bleuler wrote: "He typed these summaries himself. From 1915 on to his death, he was interested in the nervous activity of any living substance, and he thought that the psychic function was the result of differentiation and development of functions which any living substance has. The book of Pighini, which is summarized on this card, interested him because it deals with functions in plants which can be compared with nervous functions. When my father died, he left several ten thousands of both summaries of books and articles and notes on patients, from which these two cards are examples."

The cards will be framed and exhibited in the Abbe Custodianship Cabinet of the College, along with mementos of Rush, Jenner, Pasteur, Lister, Curie and others. Esmond R. Long, M.D., is the present Custodian.

The Private Psychiatric Hospital in the Future[1]

By FRANCIS J. BRACELAND, M.D.[2]

I am honored, indeed, to be invited to address this estimable gathering upon the celebration of the 160th Anniversary of Friends Hospital, the first of the private psychiatric institutions to be established in the nation and an excellent example of all that a humane institution for the care of the sick should be. The honor I gladly accept; the responsibility involved makes me humble.

It is unusual to invite an elderly physician to address a group about future directions in such an era of change, for the elderly are more inclined to rake over the past than to have ideas about the future. In one sense, however, it is wise to consider the past, for as Socrates pointed out, he liked to hear from old men, for they have been on a journey which he would have to embark upon and they would tell him whether the way was rough or smooth. This thought I hope will encourage you to hear me today, though after reading the Psychiatrist-in-Chief's report and the President's letter to the Corporators, I feel that you are already well-advised and that I can add but little to what you already know.

Anyone who attempts to predict the future of anything in these fast-moving times risks taking on the role of a prophet or a soothsayer, for there is no telling at one moment something new, some new discovery or medicament, will appear on the scene and change the whole outlook on mental illness, sick people, and the hospitals which serve them. Therefore, I will tell you what I see as an interested spectator with a reasonable knowledge of private hospitals and a deep respect and affection for Friends Hospital and all of its official family.

I would ask you to remember one thing as I begin—namely, that before your hospital opened, the mentally ill people were on the streets, in cellars, garrets, jails, and poorhouses. This is important to keep in mind, for I fear we may be returning to that unfortunate state even in this present day.

I am modest enough not to attempt to advise you; rather, I hope to lay the picture fairly before you, for you in your own good judgment must make the all important decisions as to your future. It would be fatuous and presumptuous for anyone to come as a stranger and assume that he knows your whole story, for he can never know all of the nuances of the situation in which you operate. If I seem to be a long time in getting to the point, be patient with me, for I shall try first to give you an overview of the present situation and the milieu in which you will have to operate in the uncertain future.

As to the attitude with which you approach your present problems, I can think of none better than the one recorded in the first report of your own Board of Managers in 1813. They were worried about embarking on the new venture of opening your hospital. Their grave sense of responsibility and their consecration to their cause can be read in this extract from that report:

[1] Presented at the Annual Meeting of the Corporation of Friends Hospital, Philadelphia, Pennsylvania 19124, 16 May 1973.

[2] Editor, The American Journal of Psychiatry; Former Psychiatrist-in-Chief, presently Senior Consultant, The Institute of Living, 400 Washington Street, Hartford, Connecticut 06106.

> We would observe [they wrote] that in the prosecution of this important work if some difficulties should be presented we hope they may not be permitted to discourage our efforts to overcome them, but recollecting that the design had its origin in religious motives may we proceed in its accomplishment humbly, believing that a gracious providence whose tender mercies are overall his works will not suffer this beneficent purpose to fail.

Thus the managers were concerned in 1813 as the managers are concerned tonight in 1973. The present calls first for an understanding of the fact that we are living in an era of deep and pervasive change, and yet we must carry on in it with faith and without panic.

Hippocrates spoke of the importance of change generations ago. He believed change chiefly responsible for diseases, especially great changes, "violent ones which concern our constitution and our habits." We in mental hospitals know that great changes cause stress and under marked stress a number of people will not be able to adapt and will be fated to fall by the wayside and come down with emotional disorders. Writers and poets likewise have always been aware of the importance of change, and Carlyle stated that we ourselves change and change is indeed painful yet ever needful.

The changes we are witnessing today are not ordinary changes. De Chardin sees incontrovertible evidence that man has entered upon what probably has been the greatest period of change ever known. Ills from which we suffer have their seat in the very foundations of terrestrial thought. "Something," he said, "has happened to the whole structure of human consciousness. A fresh kind of life is starting. In the face of such an upheaval, and actually shaken by it, no one can remain indifferent." Certainly those of us here who are interested in mental health or in institutions cannot remain indifferent. If we do, we soon will be hopelessly outmoded. In fact, it would be well to keep in mind in our hospitals and in our professional outlook the words of Edna St. Vincent Millay as she warned that all creatures to survive must adapt to the changing conditions under which they live. "*If they can grow new faculties to meet the new necessity,*" she wrote, "*they thrive—otherwise not. The inflexible organism however much alive today tomorrow is extinct.*"

You are aware of the fact that everything which we here have always stood for is today being challenged. People are everywhere asking: What has happened to us? One medical historian points out that what is common to periods of unrest, like the present, is that they occur when societies and their culture or segments of it are changing into something else, and when the accustomed structure of order, power, belief, and meaning disintegrates and man confronts the inscrutable foe of the future not knowing what is to come. We are in the midst of one of these great upsets now.

Daniel Boorstin of the Smithsonian Institution, a particularly sensitive observer, believes our troubles stem from the fact that we have "wandered out of history." Without the perspective of history, he argues, and without a knowledge of the wisdom of the past, we find ourselves prepared to face the challenging present and the uncertain future with nothing but abstractions and nebulous utopias.

Loren Eiseley bewails the fact that today an extremist minority is dedicated to the now and the moment, no matter how absurd, degrading, or irrelevant the moment may be. We are a society bemused in its purposes, he says, yet secretly homesick for the lost world of inward tranquility. The search for illimitable knowledge now conflicts directly with the search for serenity nowhere obtainable on earth. Knowledge, or at

least what the twentieth century acclaims as knowledge, has not led to happiness.

Well, whether we like it or not, this is the milieu in which we practice medicine and operate our hospitals today. Both are under concerted attack. Something is going to happen nationally and no one knows what. Courts, states, and municipalities are involved too. Connecticut has a hospital commission which narrowly missed being able to examine hospitals' line item budgets and thus take control of hospitals from the hands of directors and place it under the control of a political commission. Such commissions, Dr. T. Steward Hamilton told the New England Hospital Association, can control payments and force the hospital to eat up its endowment income to meet current expenses. This may indeed force some institutions into bankruptcy.

Mind you, hospitals realize that some form of cost control is inevitable, and within bounds it is right, for costs have gotten out of hand. The hospitals just do not want a political cabal going over items and disproving things which they do not understand. In these political quarrels, Dr. Hamilton pointed out the patient has become the forgotten man. Presently he is at the mercy of insurance programs and hospital regulatory agencies. The hospitals thus are in a squeeze. There is a demand for higher quality care and higher wages and more sophisticated treatment, but a demand, also, for lower costs, broader availability, and more uniform quality.

Now what about psychiatry and private psychiatric hospitals in the present situation? First, no matter how wonderful the hospital or how wide its acclaim, the public, while having a certain appreciation of its accomplishments, will always ask: What does it do for the community? Remember that your hospital, like my own Institute of Living, owes its existence to the community. Our story carries with it a warning. We were nearly taxed out of existence in the early 1950s, even though we have always been a non-profit institution. We determined that the cause was first the widespread fear that people have of mental disease and secondly because the community did not know enough about what was going on in our institution. I note with pleasure that you are already aware of this danger and that you are busily occupied in helping your neighbors and the community in general.

It is my opinion, judging from the trend of events, that there will be need for private hospitals for a long time to come and that they and the psychiatric units of general hospitals will handle a major portion of mentally ill patients. I believe, too, as does one of the largest medical clinics in the world, that, no matter what national health plan comes into existence, as long as a man has a dollar he will search for excellence and spend it to care for his loved ones in an institution which is dedicated to the best possible care of the sick.

As I say this I am aware of the existence of Comprehensive Community Mental Health Centers. In fact, I appeared before Congressional committees in order to help bring them into being. Their purpose, originally, was to treat people unable to afford private care. The stated reason also was to bring the care of the mentally ill back into the mainstream of American medicine. Unfortunately, a number of other philosophies have intervened and been brought into the picture, and the centers are having a difficult time of it.

The original idea was for the government to fund these centers and then the state and local governments later would continue to carry them on. Well, now the government is withdrawing funds from them and the state legislatures are

reluctant to take up the slack. Communities did not support these sick people in early years. They rejected them once; will they pay for their clinics now? I don't think so. In some Eastern towns communities already heavily taxed are voting down bond issues for new schools and the enlargement of old ones. Our own community was without buses for two months because of a jurisdictional dispute between state and community. Will they generously support these mental health centers? I doubt it. And if they do not, the patients will be on the streets again, for the state hospitals are refusing to accept chronic patients in a number of states at this moment.

To add to the general troubles, the hospitals are under serious attack by lawyers, civil libertarians, and other critics who mean well but are totally unaware of the overall situation. In their misguided efforts they know not what they do.

As an instance, on Friday, August 22, 1972, the dean of a large mid-western law school made an address in which he had the following things to say:

> The doors of mental institutions should be unlocked so that anybody who wants to leave can leave. [He adds] If a kookie citizen wants to be kookie he has a right to be kookie. He has a right not to be electrified or mutilated or coerced or badgered and manipulated into being like everyone else. And no doctor or policeman, spouse, parent, child, neighbor, or busybody has any right to do him out of his kookiness.

His proposals, the dean says, would mean the withering away of mental hospitals—"to replace them there would be an institution which would provide the kind of help rendered already by many psychiatrists, psychologists, and social workers, but which would resemble neither prison nor medical hospital." Personally, I have trouble trying to conceive what that would be like—also, the dean doesn't know that that is what the state hospitals started out to be when they were originally organized.

Now let's see what happens when the advice of the dean is taken. These quotations come from Dr. Robert Reich, Director of the Psychiatry Office of the Department of Social Services of New York City. After noting that the state mental hygiene department has resigned from the care of the chronic mentally ill, he notes that this backs up so that mentally ill people cannot get into city hospitals either, for they have no outlet for the chronically ill if the state hospitals will not admit them. They turn them over to the New York City Department of Social Work in increasing numbers. They either have no family or are too paranoid to deal with them so they appear at welfare offices alone, unattached, without a place to live, without medications, without treatment, hallucinating and delusional—what to do with them?

Dr. Reich then enumerates the various nursing homes and shelters to which these distressed individuals can go—all of them overcrowded, none of them giving on-going care. He reports large numbers of mental hospital dischargees as well as other psychotic and delusional people, about 12,000 individuals each year, drift to the Bowery. "We feed them about 85,000 meals per month and we give out 35,000 tickets per month for lodging. We attempt to involve them in a treatment or rehabilitation program. This population has become so severely mentally ill that even some flop houses are refusing them admission on the grounds that their behavior is to disturbing to their regular clientele."

"Most of our chronically mentally ill patients," he adds, "remain in the community living in deteriorated single room occupancy dwellings and cheap

hotels that have a total capacity of 110,000. Here they find the company of prostitutes, alcholics, narcotic addicts, criminals, and other predators who take advantage of their helplessness. These patients are robbed, abused, murdered, and suffer every indignity. In some hotels the room occupants must be out during the day so that the rooms may be hosed down. The patients hang around bus or railway terminals or out on the streets waiting to be readmitted to their rooms. You see them on the streets, talking to themselves or eating out of garbage cans. Our geriatric population is the most affected as they are most helpless." Of course, as they seek out garbage cans we observe morbidly that their civil liberties are being protected and they are saved from hospitalization.

Dr. Reich says the solution is simple—end the fantasy that brief hospitalizations and rapid return to the community is an answer to chronic mental disorder. These patients require specialized shelter for they are too ill to live in an open setting or regularly to take medication on their own. The history of psychiatry, he says, has two currents running throughout—scientific and humane ones. In our quest for progress, let us not forget our humanity.

Do you remember that at the beginning of this address I asked you to think of the situation which obtained before your hospital opened? The patients were on the streets. Well, it looks as if it is happening again, to our shame. The federal government is withdrawing its funds and state legislatures are failing to step into the breach. They have been niggardly with state hospitals throughout the years and they are hardly likely to be generous with new ventures now.

Do you see from this that hospitals like yours must go on? They are beacons in a darkening situation. They will always be needed for there will always be sick people in need of continued care, people who will not get well soon enough to satisfy their families, their physicians, or Blue Cross.

Well, within the pressures of the general unrest, the attack against hospitals by various groups, inflation, and rapidly increasing costs, you are faced with the serious problem of refurbishing, or building, and perhaps of change of location. You have apparently decided upon length of stay, for your patients, as I understand it, remain for an average of 34 days. Some patients require more, some require less. Those who require short stays need to be followed up. With a short length of stay your hospital is in competition with psychiatric units in general hospitals; in turn, general hospitals seem to be in competition with their own emergency rooms, for the latter have in large part taken the place of family physicians' offices. It is obvious, however, that you have an advantage over general hospitals, for in their antiseptic whiteness and the close quarters in which their patients must stay, they lack the beauty and the serenity which your surroundings offer.

Fortunately, our own hospital is in reasonably close proximity to a large general hospital. We saw, ten years ago, that we as an institution would have to make marked adjustments. We decided to raise funds and build new buildings on our own 35 acres. We needed to tear down a number of small cottages which were popular residences for mental patients early in the century. They were, however, no longer economical to run. It was a hard decision to make but we saw the times changing and we tore them down.

All of us must keep in mind the fact that we who are fortunate in having large grounds are looked at with envious eyes by city fathers who can conjure up numerous structures upon them which

they could erect and tax. We began to cut costs by noting that we and our neighbor, Hartford Hospital, both needed new power plants and each would cost one million dollars. By one of the greatest acts of cooperation known to man, two hospitals got together and we bought into Hartford Hospital's plant and we are heated by pipes which run underground for one and a half city blocks.

Pennsylvania Hospital tore down its old hospital at 44th and Market Streets, known popularly as "Kirkbride's," and moved its activities to 49th Street. You might inquire of them how they fared in the exchange. Several other institutions in Baltimore and farther south with extensive acreage have closed their doors. They had let buildings and staff deteriorate.

Whether you rebuild on your own grounds, which I am sure most of you hope will be possible, or whether you move to close proximity with a general hospital is your present and pressing decision. In both instances adjustments will have to be made and in both instances you will have to raise funds. If you stay on your own grounds you might be well-advised to tie yourselves to a first class general hospital even by regular bus transportation, for it is my belief that psychiatry, which is in danger of splitting as a discipline, will move closer to general medicine. We in Hartford have handled the situation by close cooperation with a general hospital, one and a half blocks away. Our laboratory work is done there, our involved x-ray work is done there, and our resident physicians study psychosomatic medicine and neurology there. Also, one of our senior physicians is on the professorial staff of the University of Connecticut Medical School which is approximately seven miles away. Students come to us from that institution and some state hospital residents attend our children's outpatient department. Earlier some of the staff was on the teaching staff of Yale University Medical School which is approximately 50 miles away.

In your case, of course, the possibility of a freeway running through your grounds complicates matters. It is serious but not necessarily fatal. I reiterate, however, that if you do decide to stay, a close tie-up with a general hospital might be desirable, for I fear for the future of institutions which become isolated. The times are not propitious for their progress.

I have tried to tell you of the winds of change and of the situation nationally. Should you require further comment on the present situation of community mental health centers to augment my observations, listen to Dr. Arnold Mandell of the Medical School at San Diego. He says: "On the left fork of the road we see chaos thus far. Community mental health centers in New York, drug abuse treatment programs in Boston, and some of the programs in Chicago (to name a few) are now defunct. Psychiatrists have proved inept when radicalized around social and political concerns. Our professional expertise has been downright inadequate in the sociopolitical arena." This is all the more reason for you and for us to maintain our medical identity.

I would like to tell you also my belief that as new drugs are discovered they will be utilized by internists, pediatricians and physicians in fields other than psychiatry. In other words, they will be incorporated into general medicine. More people will be kept out of our hospitals, for better or worse. The community will have to get used to more unusual behavior by its fellow citizens. As I already mentioned, psychiatry is in danger of a split unless some form of compromise can be made. The young,

more radical group is moving toward sociology. They feel their place is in the ghettos and their avowed intention is to eliminate poverty, racism and prejudice. Laudable as this is, those of us who are older believe that psychiatrists are not trained for that function. Instead, they are trained to care for the mentally and emotionally ill, and it would be wise for them to stick to their lasts. This I believe is one further reason for the continuance of institutions like your own.

I have no doubt but that you will make the proper decision about your future. You, like your ancestors in this institution, are dedicated to the care of the sick. You will adapt to change because of your humanistic compassionate interest in their well being. In 1944 at the 100th Anniversary of Butler Hospital Alan Gregg made the following statement:

> If, with no recognizable and singular qualifications except those of pride and historical tradition, they (the directors) refuse to get into gear with a rational and well-considered scheme of medical care, they will invite their own decline and disappearance. Hospital insurance might delay the final failure; I cannot believe it will prevent eventual breakdown.

Had they heeded that warning, Butler Hospital would still be prospering.

There are many other things to say but I have over-stayed my leave. In closing I would like to speak to those dedicated laymen who form the backbone of the mental health cause and who sometimes wonder if they are really doing enough. The answer comes easily: you are performing an important mission if you are wholeheartedly playing your part, no matter how small you consider it to be. If you only knew how often people come to doctors' offices and express the wish that they could be of help and assist in some useful venture. Generally this is as far as it goes—wishing. In regard to doing great things, Samuel Johnson once said:

> He who wants to do a great deal of good all at once will never do any. Good is done by degrees. To do the small, the modest thing which lies before us, to realize the spiritual irrevocability of our smallest acts, this is to be useful.

I know now I do not need to repeat to you Dr. Cadmus' remarks. He said:

> If the concept of our hospitals is to be appreciated by the public we must strive to inculcate the friendliness, the understanding, and the warmth which is so necessary in institutions which should be known for their tenderness and mercy.

You at Friends Hospital already have that. So finally I would like to quote Daniel Webster:

> If we work upon marble it will perish. If we work upon brass time will efface it. If we rear temples they will crumble to dust. But if we work upon men's immortal minds, if we imbue them with high principles, with a just fear of God, and love of their fellow man, we can engrave upon those tablets something which no time can efface and which will brighten and brighten to all eternity.

This is your mission, and you are in excellent professional and managerial hands to carry it out. I wish you every blessing in your difficult deliberations and in the future course you decide upon.

From Mice to Men[1]

By JOHN B. CALHOUN, Ph.D.[2]

Nearly two years ago Dr. Elliott asked me to present a paper before The College of Physicians of Philadelphia. At that time it was my intent to prepare an overview of our studies of populations of house mice in structured environments. During the delays attendant to our selecting a mutually acceptable date, I was asked to participate in a symposium titled "Man in His Place," organized by the Royal Society of Medicine. There I gave a paper, "Death Squared: The Rapid Growth and Demise of a Mouse Population" (19), originally intended for presentation here. Some aspects of this phenomenon will be discussed here. However, at this London meeting a comment was made which serves as the point of departure for my comments tonight. At the close of my Royal Society of Medicine paper a member of the audience asked if I would comment on the possible implications for the human scene of the insights I had gained from studying societies of mice. Professor J. Z. Young, the well-known comparative anatomist, chaired this session. He remarked that I should be very cautious about making any extrapolations from mice to men. This remark, coming as it did from a comparative biologist, troubled me considerably. We all recognize that mice, rats, dogs, monkeys and men are different types of creatures, each with its own species-specific characteristics. And yet we equally recognize that all are mammals, by which commonality of heritage they share many close similarities in anatomy and physiology. At these two levels of organization, progress in biomedical science assumes sufficient correspondence between form and function from lower mammals to man as to warrant fairly direct transfer of principles, subject to remaining alert to possible slight species-specific expression when insights derived from animals are applied to man.

A very contemporary statement of this attitude appeared in the NIH Record (March 27, 1973, page 8):

> A new study of triple-drug therapy for systemic lupus erythematosus, SLE, an inflammatory disease of connective tissue, is being initiated on the basis of animal investigations at the National Institute of Arthritis, Metabolism, and Digestive Diseases and at Walter Reed Army Medical Center. . . . the researchers believe that evaluation of similar treatment in human SLE patients may be warranted.
>
> Because the hereditary SLE-like syndrome of NZB/W mice is an excellent model for human SLE, these studies may provide the experimental rationale for undertaking controlled clinical trials of combination immunosuppressive drug therapy in human SLE nephritis.

A reference (1) more pertinent to the issue being explored here is titled "Experimentally induced gastric lesions. Results and implications of studies in animals." This review points out that the incidence of gastric ulcers in rats and monkeys is influenced by psychological stress and states of fear accompanying differential handling by the experimenters, demand for avoidance learning, or modifications of social communication resulting from crowding. This review carries the clear implication that

[1] Ralph Pemberton Lecture I, The College of Physicians of Philadelphia, 4 April 1973.

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comparable changes in psychological processes or patterns of social living on the human level may be expected to influence the incidence of gastric ulcers. That is to say, current opinion holds that animal studies are useful in understanding human pathologies even on the psychosomatic level.

The above reference contains the word "lesions." It is a word so commonly used by the medical profession that among its practitioners it is often assumed that "lesion" only applies to some major damage to the structure or function of an organ. Although this usage may be traced back to Galen and earlier, it was so used earlier as a special example of the broader meaning of disruption of any function or structure including physical property, social relations and moral fiber (2). Lesion in some of these latter senses is codified in Scottish law. Current restriction of usage of lesion mostly to its biomedical sense reflects a semantic myopia produced by science that inhibits us from either viewing aberrations in the sociocultural system as pathologies, or of profiting more fully from experiences gained from the study of societies of lower animals. We are still weighted down by the heritage of Descartes' dualism of mind and body. We are prone to accept the similarities of body, of structure and physiological function, shared by man and other animals, but hold out for a human uniqueness of mind, that is to say, awareness and consciousness. That we are beginning to recognize the universality of mind, in mammals at least, is reflected in the article by Harry Harlow and his associates titled "Monkey psychiatrists" (3). Principles of behavior therapy appropriate to ameliorating the impact of early deprivation of social experience have applicability to both men and monkeys. And yet our linguistic heritage, imbued as it is with considerations of human uniqueness, inhibits our profiting from animal studies. Consider the word "personality." By historical usage it is restricted to the human species-specific assembly of attributes of mood, emotion, attitudes and states of action or being. Many of the attributes which we include in human personality, such as fear, aggressiveness, passivity, emotional arousal, possessiveness, protectiveness, etc., are also recognized among a wide range of animals. We are left with such terms as "animality" and "bestiality" to refer to the character of animals other than man. And the term bestiality carries the connotation of brutality as the dichotomous distinction of all animals other than man from his quality of humanity. Without resolving this linguistic dilemma, the Smithsonian Institution's symposium, "Man and Beast: Comparative Social Behavior," goes a long way, intellectually, to clarifying the degree to which man and other animals share attributes (4). If the word "personality" is to be reserved solely for human species-specific attributes, then a perfectly rational approach demands that we eliminate from personality all aspects of every attribute which has comparable expression in any other animal. This might be a good exercise; we would find out how unique man really is. Following this logic we would be driven to the nearly absurd position of speaking of dogality, catality, ratality, etc. to give each kind of organism its species-specific dues. As we begin to break our historical intellectual bonds, I believe that we will profit more by relinquishing some of our anthropocentrisms and intentionally utilize such words as personality in a broader sense, as some authors have already had the temerity to do (5).

Concepts, which at one stage of our intellectual evolution as a species prove

profitable to separate, often become a block, or mental lesion, to further development if the dichotomies remain unbridged. Lancelot Whyte (6), in discussing the origin of the Freudian concept of the unconscious, dwells at some length on the origin of Descartes' methodology of separating mind from body, and the later impact of this dichotomy on Descartes. The vision of this new truth came to Descartes in a series of dreams of sufficient strength to serve as an imprinting experience that fixated his whole pattern of life thereafter. Of the "lonely self-awareness" resulting from this experience Whyte says:

> But his life story proves that there remained an intense nervousness, a disquieting sense of insecurity, producing an impression of insincerity, as we may easily understand. Descartes' conscious clarity was partial, and rested on a treacherous dissociation. One may suspect that all static concepts, just as they neglect process, may produce in those who surrender their minds to them an uncomfortable lesion.

Here Whyte is using lesion as a disturbance of mind very much in the same vein of its earlier usage as some disruption or damage to moral fiber. Our historical bias of considering any attribute characteristic of man as uniquely human, and therefore not applicable to any other animals, represents such a mental lesion. We have taken the position of assuming that each other species is guilty, i.e., is not capable of expressing the attribute, until proven innocent in the sense of scientific verification of comparability. I believe that it would prove stimulating to research endeavor to accept the legal doctrine of innocence until proven guilty. That is to say, the burden of proof should always be on demonstrating differences. Until that is done any principle or process revealed to hold for one species should be assumed to be universally applicable to all species. As an example of the trap we can get into by assuming guilt, let me take a statement by the biological philosopher, Marston Bates, and follow it with an observation made during some studies using a strain of domesticated rats as subjects. In attempting to clarify the bases of similarity and differences between man and other animals Bates (7) says:

> Man has retained his animal constitution which forms, however distantly a background for his actions; but his actions are more than those of just an animal. Nutrition and reproduction, for instance, are universal biological drives found in all organisms. Yet food behavior in man cannot be understood in purely biological terms. What one eats, when one eats, how one eats, with whom one eats will vary from culture to culture and are clearly learned patterns of behavior. . . .The hunger drive may be thwarted by fasting, for cultural reasons, and sometimes men will die rather than eat food they believe unfit.

In essence he says that man is unique in developing values that markedly influence his social and other behaviors, and that these learned patterns of behavior can become strong enough to lead to death of some individuals who hold them. By implication he says that lower animals can not develop such strong learned values.

We developed an instrument that could teach rats either positive or negative cooperation. It consisted of two parallel and adjacent wire channels. A lever was located at the end of each channel. Depending upon whether the lever was locked or unlocked, a rat could obtain a drop of water if it pressed the lever. For any group of rats one of two possible conditions had to be met for the levers to be unlocked. The first demanded that a rat be positioned in front of the lever in each channel. With two

rats so positioned the lever in front of each rat was unlocked, and thus each could get a drop of water each time the lever was pressed. This condition requiring positive cooperation was termed COOP for cooperation. When there was only one rat present under this condition its lever remained locked until a companion joined him. Rats learned this requirement with great precision. In the full-fledged expression of this cooperative behavior one rat would go to the instrument, stand in front of one channel and wait for a companion to come and stand in front of the other channel. Then they would both enter the channels simultaneously. The second condition demanded that only one rat be present in the instrument for the lever on its side to unlock. If another rat came into the opposite channel, both levers would lock, and thus neither rat could obtain water. This condition we called DISOP for disoperation, a kind of negative cooperation in which the rats learned to cooperate in the sense of not interfering with another. Rats subjected to this condition learn it very well.

Rats in these studies were maintained in small pens, 2.5 × 5 feet, surrounded by two foot high partitions topped with an electrified wire to prevent rats in one pen from going over into an adjoining one. Usually this precaution was quite effective in preventing adjoining groups from intermixing. During one set of studies two groups of 16 rats were housed in adjoining pens. One was on COOP and one DISOP. At this group size all rats on the COOP condition procured sufficient water. However, since it took twice as much time each day of instrument use for the rats on DISOP to meet their water requirements, the members of this group occasionally experienced intermittent episodes of mild deprivation. One member learned to climb up on top of the water reservoir in its pen and jump over the electrified fence to the top of the reservoir in the COOP pen. Once in this pen the chances were much greater than in his home pen that no other rats would be at the drinking instrument. Shortly after the DISOP rat entered one channel, the cooperative altruistic value ingrained into the COOP rats dictated that one of them would come over and join the invader. Although the presence of the COOP rat enabled the DISOP rat to obtain water, the very presence of another rat beside the DISOP rat became disturbing to him. His learned value dictated that drinking should be pursued in solitude. He would shortly back out of his channel, grasp the offending COOP rat by the rear, tail, or hind feet and pull him out. This behavior sequence persisted for many days until half the COOP rats died from wounds and I felt constrained to terminate the lives of the remainder because of their extreme wounding. In all this process the COOP rats never fought back, despite the pain inflicted upon them. To them the DISOP rat was always behaving correctly.

Judged strictly by the observed behavior, the COOP rats had learned an altruistic value including a taboo against aggression toward associates whose basic behavior met the requirements of the setting. In the natural ecological setting of the wild species from which this strain had been derived, the probability of encountering a situation requiring the development of such a value system is extremely small. One might counter this example by saying that the species did not generate the condition which generated the value, whereas many of the values held by man have arisen directly out of human endeavor. Although this latter may be true for the species as a whole, in so far as any maturing individual is concerned, the settings and opportunities encountered are in effect

imposed by an outside force beyond our consciousness. Left to our own devices, that is, to a dependency on our hereditary constitution alone, few of us indeed could manage to match the complexities of values and behavior characterizing our pre-cultural ancestors, those simple hunter-gatherers of fifty millenia ago—a time at which our genetic constitution likely differed little from that which we possess today. The point here is that all animals possess preadaptations for coping with situations never experienced during the prior history of the species. We certainly would not expect any species of mammal to surmount all of its neural limitations and biases and differences of capacity for responding and behave exactly like man in settings which simulate those of human experience. However, this study of DISOP and COOP rats alone points up the feasibility of conducting studies with lower mammals that give promise of gaining additional understanding of phenomena thought by many to be unique to man. The study mentioned here has been presented in more detail elsewhere (8, 9).

Our willingness to extrapolate to man insights gained from studies with other animals on the body-physiology level, coupled with greater reluctance with regard to making similar extrapolations at the mind-behavior, particularly social behavior, level presents the possibility of our getting into a real trap if this myopic mental lesion persists. As an example of such a trap possibly developing, I wish to take the case of vitamin A. It is well recognized that an adequate intake of vitamin A is necessary to prevent night blindness and other hypovitaminosis A pathologies (10). In humans a daily intake of 2500 international units (i.u.) is adequate to prevent the hypovitaminosis A pathologies. In many parts of the world the minimum daily requirement has been given at 3750 to 5000 i.u. as a precaution to cover possible genetic variability in requirements. Most recognized hypervitaminosis A pathologies, mainly anatomical or physiological, do not appear until after sustained daily intakes in excess of 50,000 i.u. There is probably no other field of biomedical research where insights about a natural element of diet has relied more on research with rats. It is to be noted, however, that the rat subjects used have universally been housed within the confines of small cages that preclude expression of social and other behaviors of which the species is capable of in the natural ecological setting. Under these restricted conditions, the results of many investigators led to the conclusion that moderate elevation of vitamin A intake increased body growth and reproductive success. As a consequence commercial producers of laboratory animal foods increased the vitamin A content of their products. In a series of studies I engaged in concerning social behavior and population dynamics of rats in large structured habitats (11), the diet contained four times the normal level of 3 i.u. of vitamin A per gram of diet. At the time I was unaware of the increase to 12 i.u. per gram of diet, but during the course of the studies, I noted certain physiological pathologies that suggested something wrong with vitamin A metabolism. As a consequence the studies were repeated utilizing a synthetic diet (12) in which only vitamin A was varied. One diet contained 3 i.u. of vitamin A per gram of diet and the other 12 i.u.

The general character of these studies has been presented elsewhere (13). For the present purposes it suffices to note that the population was initiated with a group of rats born in the setting to introduced near-term females. The young of these females slightly exceeded in number what I suspected was the ideal

number of rats for this setting. They were designated as Tier 1. Later two other tiers of equal number, Tier 2 and Tier 3, were allowed to survive as young born to prior tiers. Tier 3 was born when conditions had become particularly stressful from crowding. Table 1, based on data in prior publications (8, 9, 14), summarizes the main points bearing on the question of pathologies arising from moderate elevation of vitamin A intake by rats.

By nearly seventeen months of age considerable vitamin A was stored in the livers of rats on both diets, but 31% more had been stored by those on the higher vitamin A diet. Rats on this higher dosage diet engaged in much less intense aggressive acts as indicated by reduction in amount of wounding. This reduction in aggression by elevation of vitamin A in the diet is particularly indicated by the even greater reduction of wounds on the lumbar-sacral region. In status interactions the loser often is bitten on the rear as it turns and flees. The lesser amount of scar tissue developing on this region of the body also indicates a reduction of aggressiveness associated with the higher vitamin A diet. At first sight one might consider reduction in aggression as a positive asset to increasing vitamin A intake. However, other measures were taken that threw an entirely different light on the situation. Observations were made of the frequency of each rat being active in those regions of the habitat where social interactions more often took place. This measure of activity was called "social velocity," or just shortened to "velocity." As group size increases the average velocity decreases. That is to say, crowding suppresses degree of social activity. Since the velocity of rats on the higher vitamin A diet was greater than that for those on the lower vitamin A diet, it appeared that in some way vitamin A protected the rats from the effects of crowding. This, too, seemed at first to be a positive consequence of elevating the vitamin A content of the diet. However, at comparable levels of velocity the 12 i.u. rats engaged in 30 percent fewer social interactions; they became less involved socially. As a final test a number of males on each diet were removed for a week at a time and placed alone in apparatuses which recorded the start and stop times of several behavioral states, essentially the entire repertoire possible in the restricted test situation. Rats on the higher vitamin A diet engaged in thirty percent more episodes of behavior per day. This meant that their behavior had become more fragmented than those on the normal diet, and thus were less capable of executing longer sequence, more complex behaviors. These same rats also exhibited deficits in selecting appropriate sex partners. We finally concluded that an elevation of vitamin A intake to four times the normal level impedes the capacity to perceive complex gestalts and to execute complex behaviors. For this reason the rats on the higher vitamin A diet were sufficiently out of social contact to buffer them from the stresses of crowding.

The data for females is less in scope, but much more dramatic. During the formation of the third tier, nest boxes were opened more frequently than usual in order to determine which females were the mothers of particular litters. Such disturbance by the investigator aggravated behavioral aberrations already present from crowding. Both contributed to a reduction in effective maternal behavior. With sufficient interference with maternal behavior the young are not reared to weaning. Considering all litters, females on the higher vitamin A diet exhibited a 55 percent decrease in ability to rear young to

weaning. For litters disturbed when the young are very immature, before three days of age, this loss of maternality was 85 percent more for females on the 12 i.u. diet. When both sexes are involved directly in a particular act, such as that leading to conception, the deficit exhibited by rats on the higher vitamin A diet is even more dramatic. In uncrowded situations conception rarely occurs before 80 days of age. Thus the frequency of earlier conceptions can be construed as an indication of some upset in normal behavior. It may be noted that the 12 i.u. females exhibited a 189% increase in these earlier conceptions. The question here is not whether females can or cannot conceive from a physiological point of view, but whether they should. Under the complexities of living in a complex physical and social environment female rats do not achieve 50% of maternal adequacy until after 210 days of age. Thus evolution has led to timing of behavioral development such that intercourse is normally delayed until related environmental learning has begun to unfold more adequately. This complex behavioral development has evolved with the rats exposed to a diet close to the 3. i.u. of vitamin A per gram of diet level. I can only conclude that an increase in vitamin A in the diet to four times the normal level alters the neurophysiology to a point that it is not in harmony with life in a complex socio-environmental setting.

Regarding these studies I wrote in 1967 (8):

> If this increased intake of vitamin A has effects on the behavior of humans comparable to those on the behavior of rats, we may anticipate some very bizarre alterations in the fabric of social relations as an increasingly larger proportion of the adult population becomes characterized by high circulating levels of vitamin A. At this early state of experimental research and with little known about the effect of vitamin A on human behavior, it is extremely hazardous to make projections. I merely wish to point out that when a chemical compound can produce changes such as vitamin A apparently does in rats, we can slowly set an ecological trap of such magnitude that, once caught, society might experience extreme difficulty in extricating itself.

Recently, for reasons I am not familiar with, the Food and Drug Administration has begun to alter regulations in a way that will make it more difficult for human individuals to procure, or be exposed to taking in more than 10,000 i.u. per day in excess of that in natural foods. For man 10,000 i.u. of vitamin A per day is approximately equivalent to 12 i.u. per gram of diet for rats. Professor Linus Pauling has recently (15) argued for permitting everyone the opportunity to increase his daily intake to 25,000 i.u., that is, to ten times that known to be physiologically necessary. In making this recent statement, Professor Pauling said that he knew of no known data that indicated that such dosages were in any way deleterious. I can only remark that in response to an inquiry from him all of the details of the studies cited above on rats, including that which has just now reached press (9), had been made available to him. In any case, we might briefly consider his theory of "ortho-molecular psychiatry" (16). During evolution each species developes more and more elaborate biochemical machinery to process more effectively each substance that it obtains in its natural diet, or as a breakdown of it. There is some average rate of acquisition of each substance. In general, evolution of more complex biochemical machinery ceases at about 91% of maximum efficiency since each successive slight increase in efficiency requires ever larger increments in complexity of the added biochemical capacity. When a mutation occurs that blocks the normal transformation of

some substance, individuals of the species may be kept alive despite these inborn errors of metabolism provided sufficient quantities of the missing substance is provided. Depending on how one measures the metabolic rate, for example growth rate, as dosage of the missing substance is increased a curve such as shown in Figure 1 results. Increasing the dosage sufficiently permits metabolism to exceed that of the 91% of the maximum which characterizes the normal organism.

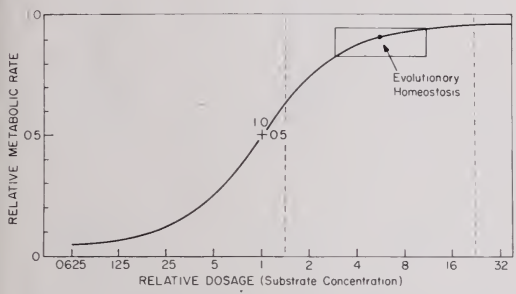

Fig. 1. Generalized curve of the impact of substrate concentration on metabolic rate. According to Linus Pauling evolutionary homeostasis is reached at a substrate concentration permitting about 91% efficiency of metabolism. Normal metabolism holds within a range of one half to two times the substrate concentration producing 91% metabolic efficiency. Extreme pathologies, physiological, psychological, or behavioral presumably follow any decrement of substrate below one fourth normal or above four times normal.

Dr. Pauling's thesis is that we can assist the organism to achieve maximum efficiency by providing even the normal organisms with excesses of substrates beyond that normally available to it directly through its diet, or as a by-product of metabolizing substrates in the diet. Furthermore, he maintains that since we can synthesize so many of these required substrates so cheaply, we *should* enable everyone to attain maximum biochemical efficiency. I believe that there is a serious flaw in his thesis, which may be particularly dangerous in the case of vitamin A. As a rough approximation of the natural availability of vitamin A we may take the range of 1250 to 5000 i.u. per day for man and 1.5 to 6.0 i.u. per gram of diet for rats as approximate equivalents for these two species in terms of the conditions under which they evolved. These extremes are noted by the left and right hand sides of the rectangle in Figure 1 depicting the variability about the evolutionary norm of 2500 and 3 i.u. respectively as criteria for the normal metabolic requirements of the two species. By one fourth the normal level, hypovitaminosis pathologies characterize both species. Thus, it seems well grounded that a reduction of substrate availability to one fourth that compatible with the evolutionarily determined normal rate of metabolism produces pathology.

By the same logic we might anticipate some types of pathology to appear when the substrate availability is increased four fold. The fact that major hypervitaminosis A pathologies, particularly those "body" ones of gross changes in physiology and anatomy, generally do not appear until more than ten times the intake of vitamin A above normal, does not invalidate the possible existence of pathologies affecting the "mind" in ways that take longer to detect as the individual through its mind and behavior interacts with its complex environment—an environment normally much more complicated than that of an individual rat or human living out its days in a barren cell. At the present time it must be admitted that this one study of mine, which shows that rats do exhibit marked pathologies of behaviors requiring mediation of mind when vitamin A intake is four times normal, can only be taken as suggestive of possible comparable pathologies on the human level. However, I might add that such pathologies are insidious in the sense that much of the

TABLE I.
Influence of Vitamin A on the Social Behavior of Osborne-Mendel Strain Rats

Item No.	Item Description	Diet 3 i.u.	Diet 12 i.u.	Percentage change by rats on 12 i.u. diet
1.	Mean i.u. vitamin A/whole liver at 16.5 months of age. Tier I, males + females.	31,631	41,510	+31
2.	Mean i.u. vitamin A/whole liver at 6 to 7 months of age. Tier 3. Males + females.	15,216	20,999	+38
3.	Mean No. of wounds between 9 and 15 months of age. Tiers 1 and 2, males.	21.8	13.7	−37
4.	Mean No. of lumbar-sacral wounds only	11.0	5.0	−55
5.	Mean lumbar-sacral scar tissue index. 10 high velocity and 10 low velocity males. Tiers 1 and 2.	3.75	2.55	−32
6.	Mean social velocity. Tiers 1 and 2 males.	25	34	+37
7.	Relative No. of social status interactions at the same degree of velocity.	100	70	−30
8.	Behavioral states per 24 hours	95	124	+30
9.	Percentage of conceptions before 80 days of age	14.7	42.3	+189
10.	Percentage of young of Tier 3 generation reared to weaning under conditions of severe crowding. Average age at disturbance by investigator circa 10 days	53.8	24.2	−55
11.	As 10, but mother disturbed by investigator when young were 2 or less days of age.	49.5	7.5	−85

outward behavior of affected individuals appears extremely normal. Most complex behaviors and capacities for perception are influenced first. These slight deficits are magnified by the interaction of individuals similarly affected.

In this connection particular attention needs to be called to Item No. 2 in Table I. Third tier (generation) rats were born in a population already marked by severe overcrowding. When the study was terminated, the members of this generation were between six and seven months of age. Although those on the higher vitamin A diet had stored 38% more vitamin A in their livers, rats of Tier 3 on both diets had stored twice as much for their age as would have been anticipated by the rate of storage required to produce the level of storage of the older Tier 1 rats who had matured under less crowded and disturbed conditions. I conclude from this that increase in vitamin A storage is a normal mechanism for protecting the individual against chronically present disturbing social stimuli. At six to seven months of age rats in a normal social setting reach their prime with regard to participation in sexual and social activities. At the termination of the populations in this study, all subjects were autopsied except for four males and four females in the Tier 3 generation. Like most of their companions of this generation they presented an excellent physical appearance unlike the more scarred and scruffy appearance of the older associates of Tiers 1 and 2. That is to say, they had been able, presumably as a result of heightened circulating levels of vitamin A, to avoid becoming embroiled in social conflict despite the crowded conditions. In this now low density situation these Tier 3 rats failed to engage in sufficient sexual activity to culminate in conceptions. In our later studies with mice populations (17, 18, 19) we have called

such physically attractive, but behaviorally inadequate, individuals the "beautiful ones."

The historical conditions leading to the production of "beautiful ones" illustrate another type of animal experimentation, which can provide insights applicable to man and ones that are less easily ascertainable from the natural experiments in which we might be involved. A few mice were introduced into an environment providing resources for a very large population and eliminating most causes of mortality other than from aging. Under these conditions the population grew rapidly, social groups formed with each establishing a portion of the physical space as its domain. Effective playing of social roles was only in the context of social groups. Eventually most desirable physical space was filled with social groups. At that time there were many more well nurtured subadults maturing than normally would be the case with customary mortality factors operating. Rejection of the attempts of these younger mice to enter and participate in the established social groups overtaxed the territorial males to the point that they expressed only minimal, spatially restricted, mild threats. Nursing females then assumed the territorial defense role. Their heightened aggression generalized to their own young. Many of the young were maimed and killed during the first few days of life, suggesting a parallel to the "battered child" syndrome. Females, presumably less disturbed and less aggressive, continued to nurse their young until they became furred and eyes opened, and they began to wander about the nest compartment. Then several days before weaning—a long time in the life of a mouse—mothers attacked their young, often breaking their tails near its juncture with the pelvis. These young then left home prematurely without having developed strong affective bonds with any adult. In the then dense social milieu any attempt at developing an interaction with an associate was mechanically interrupted—an interruption of action cycles—by some other mouse moving between the two. As a consequence of these processes, most of the last generation never learned to relate effectively. Not courting, there was no mating, and with no mating there were no conceptions. Eventually all members of this large population of mice died from old age with no recovery even after the population had greatly declined. Thus the ultimate effect of such a history of overcrowding is to produce individuals incapable of those complex species-specific behaviors necessary for species survival. For mice these most complex behaviors involve the repertoire of courting, mating, and territorial defense. Their loss is reflected in zero fertility. It has been my prediction that a comparable history affecting mankind would indicate its origin in just the opposite—an increase in fertility. The most complex behaviors for the cultural human animal are ideational, the creation and utilization of ideas. Fragmentation of ideation should inhibit the capacity of individuals to comprehend the complex ecological, economic, and social ideas that are essential to motivate couples to limit their family size. That this process is in fact operating has recently been revealed by a detailed study of demographic data for the city of Chicago by Professor O. R. Galle and his colleagues at Vanderbilt (20). They confirmed much of my earlier conclusions with crowding in rats (11, 13). They found that behavioral and physical pathologies did accompany crowding in man. However, they also found that, regardless of ethnicity, socioeconomic status or education, fertility went up with crowding.

My last example of the opportunities

for gaining insight into human phenomena based on animal studies involve mice and churches. Consider mice first. Most individuals of most species studied eventually settle down with attachment to a particular home site from which they engage in excursions into surrounding habitats. Traps can be set in the habitat which capture the mice alive. They are then marked, released and recaptured at later times in similar baited traps at other locations. Once a large number of such captures have accumulated it is found that per unit area there are relatively many captures near the home, and ever fewer with increasing distance from it. In other words, density of responses declines with radial distance from home. The exact pattern of decrease conforms to the bivariate normal distribution curve (14). This says that 38% of responses occur within a one sigma radius from home, 86% within a two sigma radius, and 99% within a three sigma radius (Figure 2). When one examines the several species of mice and shrews inhabiting extensive tracts of woodlands, it is observed that different species vary with regard to the size of their home range as so measured. In general species whose members have large home ranges are more recently evolved ones, while those with small ranges generally have a history extending farther back in the paleontological record. After selective removal of individuals with large home ranges, those normally having smaller ranges immediately enlarge their ranges to about the size of those individuals previously removed. Clearly, the more advanced, adaptable species have a capacity to inhibit the normal tendency for ranging of more ancient traditional types.

If these principles characterizing mice and shrews represent a more universal process of the organization of living matter, then their expression should

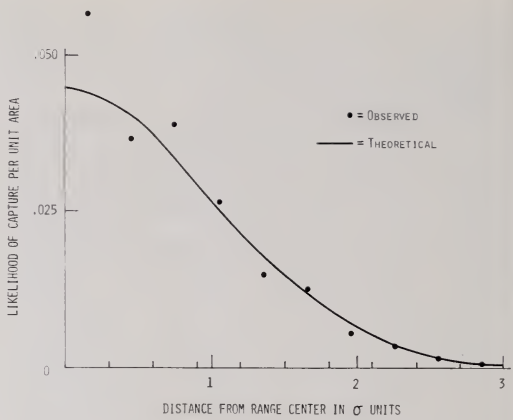

Fig. 2. Home range of mice. One sigma defines the radial distance from the home site within which 38% of the responses to resources occur. 99% of such responses are encompassed within a radial distance of three sigma. (See Ref. 14 for details of the mathematical formulation of home range.)

characterize a quite different level. Then I thought: "Suppose human institutions behave like mice and shrews?" Churches seemed an appropriate type of institution—they have recognized physical home sites, church edifices—from store fronts to cathedrals. If churches are like mice, they must "travel" out into the surrounding habitat and seek resources; sinners will do; to be brought in and saved and convinced to become affiliates of the church. Confirmation that the individual is in fact a resource for the church is represented by the individual departing from the church, going home and then returning to the church on a later occasion. Thus the homes of members of a church represent the place of response by the church. Figure 3 depicts the analysis of such responses by the Warner Memorial Presbyterian Church of Kensington, Maryland. The home range of this church conforms to the same mathematical distribution as that observed for mice. From that point I examined the ranges of Protestant churches for the District of Columbia and suburban Maryland adjoining it.

Without engaging in fine theological distinctions, it is possible to roughly categorize denominations and faiths along a spectrum from liberality (emergent evolutionary adaptation) to orthodoxy (traditional preservation of earlier modes of adaptation). As with mice and shrews it was found that more recently evolved liberal types of churches had larger ranges, drew their members from longer distances. And as with small mammals the somewhat more orthodox, conservative, or traditional churches are more numerous because their ranges are smaller, and having smaller ranges they make more effective use of resources within their range. Extremely orthodox or conservative churches, like species of small mammals that are adapted to specialized niches that permit them to avoid competition with more generalized and widely adapted species, are relatively few in number and spatially isolated from other similar churches.

Obviously there is no one-to-one identity of correspondence between the elements, mice and churches. Yet each kind of element represents an organization of matter with capacity to acquire resources and interact with other elements of their own kind to express isomorphic processes reflecting awareness of and responsiveness to surrounding environment. As with the impact of overcrowding on fertility in mice and man cited above, so here in the case of home range an isomorphic process may operate at both levels of organization, although its complexity of expression is much greater at the higher level involving man. The central thrust of evolution results in an orthogenetic increase in awareness and responsiveness as successively more complex units interact with each other. Understanding a lower level of evolved consciousness and responsiveness can assist in understanding a higher level. The changes through time from one level to another appear to be unidirectional. Whyte (6) remarks: "The search for adequate conceptions of one way changes still continues, and its successful culmination would mark an important step in the rational potentialities of the human brain-mind."

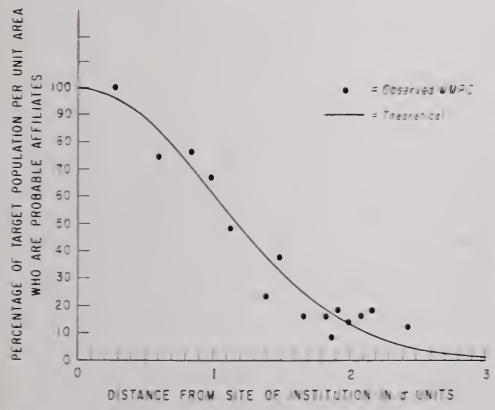

Fig. 3. Home range of a church. Each dot represents the percentage of residents at a given distance from the church who are members of this church.

Whyte further remarks: "To postulate the existence of the two separate realms, one of which is characterized by awareness, as Descartes did, may prove one of the fundamental blunders made by the human mind." Progress in remedying this blunder is essential to enabling the biomedical and behavioral sciences to maximize their contribution to human well-being and continued participation in the evolutionary process. It is similarly essential to the more adequate utilization of studies with animals to enhance our understanding of man. Formulations of Meldman (21) and Bertalanffy (22) help to give direction to the resolution of the mind-body dilemma:

Meldman:

At the bottom of Descarte's psychology lies his dualism of soul (mind) and body. . . . It seems to be a severe stumbling block; impeding progress at all levels of behavioral investigation. . . . The births of psychology with its

methods of investigation, and physiology with its methods of investigation are a direct consequence of the mind-body dichotomy. The attempt at synthesis through psychophysiology is an attempt to repair that which was originally torn apart. . . . The idea that emotions cause bodily disease, rather than both being responsive and subordinate to a commonly shared transcendental variable, is a concrete result of the mind-body dichotomy. . . . As suggested by Bertalanffy, a liberating concept is needed to further transcend and synthesize behavioral events.

The purpose of this communication is to present a concept of attention which may prove useful in resolving the mind-body problem. . . . On the one hand [attention] has been used to refer to processes that determine an organism's degree of alertness or vigilance (how effectively behavior is being controlled by the stimulus field as a whole). This general arousal aspect of attentive activity is mediated by the caudal portion of the ascending reticular activating system and is concerned with quick startle and arousal responses as well as the general transition from sleep to waking. The notion that a stream of consciousness is being replaced by that of a volley of consciousness. . . . On the other hand, the term attention has been applied to the selective process that determines which elements of the stimulus field (including the person) will exert a dominating influence over behavior. . . . The transition from mere awakening and arousal to a state of differential responsiveness, to focusing selectively on a single perceptual mode and focusing attention within that mode, seems anatomically related to reciprocal feed-back actions between the ascending reticular activating system, the nonspecific nuclei of the thalamus and the diffuse thalamo-cortical projection system.

Attention is the scanning process which scans for symbolic representations in the circumspective phase of thinking. . . . Attention . . . controls energy distribution in the initiation and maintenance of motor actions. . . . It is the subject of attention that we focus our attention in order to find a liberating concept capable of freeing us from the confines of the mind-body shackles. This model assumes that attention is of information and energy and transcends all behavioral events while simultaneously responding to all subordinate subspheres in a never-ending reciprocal feed-back. Attention may be abstractly construed for theoretical purposes as a particular kind of information—as a node of coded information in a universal sea of messages. Just as (Nobert) Wiener said: "information is information and not matter or energy," so (Paul D.) MacLean said: "Psyche is information, not matter or energy." To this we add, "Attention is information." . . . Behavioral scientists are engaged in decoding attention in much the same way others are decoding nucleic acids. . . . Attention is thus the synthesis for the mind-body problem."

Bertalanffy:

Without attempting to decide whether there is a true numerical increase [in psychosomatic disease] due to the stress of modern life, or whether we have only become more aware of the problem, there is no question that psychosomatic disease is a medical problem of the first order. "Psychosomatic" is, of course the mind-body problem expressed in medical terms. . . . A second point is what may be called the *methodological helplessness of psychiatry.* That psychiatry wavers between such extremes as drilling a hole in the skull, with insult to the most important system of the body, and the mere pep talk of some forms of psychotherapy is an expression of the deep-seated insecurity prevailing in this field. This is not a question of ignorance which may be overcome by some new discovery tomorrow . . . rather, it seems as if our ways of thinking, or basic concepts and categories are inadequate. A reconsideration of fundamentals is thus imperative—an important part of this is the old problem of body and mind. . . . Inconsistencies and paradoxes in modern psychiatry are largely due to the fact that psychological theory is based on an obsolete belief in the dualism of body and mind. . . . The dualism between material brain and immaterial mind is a conceptualization that has historically developed, and is not the only one possible or necessarily the best one.

We shall have to concede that a monkey or dog sees, feels pain, has certain desires and anticipations. If we do, there is no break somewhere lower on the evolutionary ladder. . . . Two fundamental principles of ethology should be emphasized: the Umwelt of a given species is determined by the latter's organization—in particular, the structure of its receptor and effector organs; and the human Umwelt—the world as we experience it—is only one of countless universes of living beings. . . . As Lorenz has emphasized, neither man nor any other living being would have long survived if its perceptions did not mirror—in whatever distorted way—those features of the universe upon which the life of the species depends.

In the world picture of modern science, no

ultimate reality is claimed for the little billiard balls and an immaterial mind to play with or be affected by them. . . . Rather there is a reality which in exteroceptive experience is observed as a world of things, and in proprioceptive experience as ego. In science, this is described, with respect to certain structural aspects, by physical and psychological theories. . . . Physics and psychology (both taken in a wide sense) are conceptual constructs representing certain aspects of reality. The first consequence is that we have to relinquish so-called reductionism. Both the worlds of physics and of psychology are constructs to bring certain aspects of the experienced universe under the rule of law. . . . We must postulate an *isomorphism* between the constructs of psychology and neurophysiology in order to relate them. . . . Recent theory construction in cybernetics, information theory, general system theory, game and decision theory, etc., elaborate constructs precisely of this kind—constructs that are neither physical nor psychological, but are applicable to both fields.

The fact that 50% or so of hospital populations is psychiatric patients is the most dramatic illustration that something is fundamentally wrong with conventional principles. . . . As a matter of fact, with notions such as emphasis on activity and creativity, self-realization, and the like, psychology has already escaped the fetters of the S-R model and is tending toward new concepts of the kind I tried to indicate. Much is said . . . of existential neurosis arising from . . . the meaningless of life in modern society, a world in which values, purposes, and goals have collapsed. . . . The affliction may be sufficient to provoke suicide. Or in the problem of delinquency . . . it has been said that a new style of crime has appeared—crime not because of need, for material gain, or out of passion, but crime for "thrills." . . . These are disturbances which originate in a breakdown of the value system, loss of goals of life and of spiritual orientation—that is, they come from that third realm, other than matter and mind.

Both physics, including neurophysiology, and psychology, including unconscious processes, are theoretical constructs aimed at explaining, predicting, and controlling observable events; they are connected with the latter only by extensive chains of reasoning. Both are progressively deanthropomorphized, that is, the properties characteristic of human experience and Umwelt are progressively eliminated. What eventually remains are conceptual models and relations serving the purposes of explanation, prediction, and control. This process is far advanced in physics and beginning in psychology.

The classical dualism omitted precisely that realm which is specific to human, as compared to animal behavior and psychology: the field of culture, symbols, values, etc., which are neither "physical" nor "mental," but have their own autonomous laws. Basic as well as clinical psychology must recognize this realm because it is precisely the sphere of specifically human behavior, and new developments in both fields may be expected from a proper acknowledgement of this fact.

Despite his earlier remarks with regard to the fact that other animals share with man the third Umwelt realm of being imbedded in an environmental milieu of objects and processes, Bertalanffy, in his closing statement, falls into the customary anthropocentric trap of considering the total uniqueness of man with regard to his capacity for altering his mental-behavioral template as a result of the historical flow of events of whose flow he is a part. We are all subject to the bias of our own historical experiences that block the expression of both rationality and intuition—Bertalanffy no less than the rest of us. He as a physiologist, lacking the experience of detailed observation of the social life of animals in complex environments extending over consecutive generations, must perforce be myopic to his own logic. Elsewhere (23) he says:

It is the zoomorphic or rattomorphic fallacy—the expressed or implicit contention that there is no essential difference between rat and man—which makes American psychology so profoundly disturbing. That there is a thing called *human culture* with its myriads of manifestations, and that there is nothing of the sort in pigeons and monkeys, is an observed fact . . . .

Rather, I hold that all organisms, from those with the simplest neural net to man, develop their being out of the interrelationships of the triune realms of

body, mind and environment. Attention as information unites mind and body in harmony with the perceived environmental Umwelt. But this attending is more unconscious than conscious. Most of long term memory storage in man (and presumably in lower animals) is not subject to immediate recall. Much less are we aware of the biochemical processes that mediate awareness or are affected by it. Nor through direct experience can we be cognizant of the nature of the complex ecological and social processes transpiring all about us and affecting each moment of our lives. Even more in darkness remain those animals with lesser capacity for attention than man. Long ago Immanuel Kant (6) recognized this pervading darkness:

> Only we can be indirectly aware that we have a perception, though at the same time we are not directly aware of it. Such perceptions are called *dark*; the others clear.
>
> The field of our sense perceptions and sensations, of which we are not conscious, though we undoubtedly can infer that we possess them, that is, the dark ideas in Man (and so also in animals), is immeasurable. The clear ones in contrast cover infinitely few points which lie open to consciousness; that in fact, on the great map of our spirit only a few points are illuminated: this can lead us to marvel regarding our own nature.

For both man and other animals most of their nature lies in darkness. Within this darkness many similar processes—physiological, mental and environmental—determine what the individual is and may become. Comparative studies encompassing physiology, psychology and ecology, if pursued in an holistic, synergistic manner have the power of shedding light on the degree to which processes operate regardless of the evolutionary level considered. However, if studies with animals other than man are to make an effective contribution to the understanding of man, we must have a good appreciation of the nature of man, as well as the scope of studies on animals that may further elucidate this nature.

ON THE NATURE OF MAN

If studies on animals, beyond those involving just physiology, are to have implications relevant to man, the investigator himself, must gain considerable insight into the nature of man. The following is a collage of comments by authors who have attempted to come to grips with the nature of man. They represent one-half of one percent of a larger collection of such excerpts which I assembled to give me background for my own research with animals (24).

Early Evolution

Hockett, Charles F. and Ascher, Robert (24.01)

We know that long ago, over a long period of time, our own ancestors abandoned the trees for the ground and developed effective machinery for bipedal locomotion. This seems beyond dispute, because the prehominoid primates were aboreal and we ourselves are bipedal ground walkers. But when we ask *why* the change, we must remember that our ancestors of the time were not striving to become human. They were doing what all animals do: trying to stay alive. We shall call (this survival principle) "Romer's Rule," after the paleontologist, A. S. Romer. We phrase the Rule as follows: "The initial survival value of a favorable innovation is conservative, in that it renders possible the maintenance of a traditional way of life in the face of changed circumstances."

Some of the descendents of the protohominoids moved out of the trees and became erect ground-walking bipeds.

Geological evidence suggests that at one or more times during the East African Miocene a climatic change gradually thinned out the vegetation, converting continuous tropical forest into open savannah with scattered clumps of trees. As the trees retreated, some bands of hominoids retreated with them, never abandoning their classical arboreal existence. Other bands were caught in isolated groves of slowly diminishing extent. In due time, those bands whose physique made it possible for their numbers to traverse open country to another grove survived; those that could not, became extinct. Thus, for those bands, the survival value of the prerequisites for safe ground travel was not at all that they could, therefore, begin a new way of life out of the trees, but that, when necessary, they could make their way to a place where the traditional arboreal way of life could be continued. The hominoids that were successful at this included those ancestral to the great apes and to ourselves.

Sometimes the band forced to try to emigrate from a grove would be the total population of that grove. More typically, we suspect, population pressure within a diminishing grove would force bands into competition over its resources, and the less powerful bands would be displaced. Also, when a migrating band managed to reach another grove, it would often happen that the new grove was already occupied, and once again there would be competition. Thus, in the long run, the trees would be held by the more powerful, while the less powerful would repeatedly have to get along as best they could in the fringes of the forest or in open country. Here is a double selective process. The trees went to the more powerful, provided only that they maintained a minimum ability to traverse open country when necessary. Some of these successful ones were ancestral to the great apes of today. Our own ancestors were the failures.

Burton, Arthur (24.02)

In the evolution of man as a species, his upright or vertical stance has been most impressive to biologists and to man himself. There seems to be an evolutionary principle in all biological species, and particularly notable in genus *Homo*, that calls for a reaching out and extension of the organism to wider and wider experience—to more and more environments—to maximal development. In this the ability to stand upright and to comprehend the earth from above must be ranked on a par with the evolvement of a more sensitive nervous system.

The Big Brain

Eiseley, Loren (24.03)

The lost significance of Alfred Russel Wallace lies in this: five years after the publication of the *Origin of Species*, Wallace, passing one step beyond Darwin, perceived that with the emergence of the human brain, man had, to a previously inconceivable degree, passed out of the domain of the particulate evolution of biological organs and had entered upon what we may call history. We, as human beings in whom the power of communication had arisen, were leaving the realm of phylogeny for the realm of history, which was to contain, henceforth, our essential destiny. After two billion years of biological effort, man alone had seemingly evaded the oblique trap of biological specialization. He had done so by the development of a specialized organ—the brain—whose essential purpose was to evade specialization. Pere Teilhard has sought to extend Wallace's insight.

Bruner, Jerome S. (24.04)

What is most unique about man is that his growth as an individual depends upon the history of his species—not upon a history reflected in genes and chromosomes but, rather, reflected in a culture external to man's tissue and wider in scope than is embodied in any one man's competency. Perforce, then, the growth of mind is always growth assisted from the outside.

Huxley, Julian (24.05)

It is to man's higher level of intelligence that he owes his evolutionary dominance. (Note that Huxley says "dominance," not "difference.")

Huxley, Julian (24.06)

During the biological evolution of animals, the upper level of organization of awareness has been steadily raised. This has led to a steady increase in the extent and elaboration of what we may call the animal's significant world, that part of the universe which has meaning for the organism. It utilizes the raw material of its experience and transforms it into characteristic patterns of awareness which then canalize and help to direct its behavior. This I venture to call psychometabolism. About 10 million years ago, purely biological evolution reached a limit, and the breakthrough to new advance was only brought about by further psychometabolic apparatus of mind and brain. This gave rise to man: it endowed him with a second method of heredity based on the transmission of experience, and launched a new phase of evolution operating by cumulative tradition based on ideas and knowledge. In man, organization of awareness became part of the evolutionary process by being incorporated in cultural tradition.

Communication

Dryer, Bernard V. (24.07)

The growth of our civilization over fifty centuries has in large part depended upon man's ability to record his observations, assumptions, thoughts, and personal and social adaptations—called knowledge—and to receive such recordings in word or in writing from others who communicate it to him.

Muller, Herman J. (24.08)

Among the qualities of man most generally valued are a genuine warmth of fellow feeling and a cooperative disposition, a depth and breadth of intellectual capacity, moral courage and integrity, and an appreciation of nature and art, and an aptness of expression and communication. It has been through the exercise of these faculties that man has raised himself to his present estate.

Titchner, James L. (24.09)

Freedom is an inner finding of the self, an expanding recognition of one's choices of ways to be human. It entails an unguarded freedom of communication with others. There is no peace, only an essential human restlessness.

Hinkle, Lawrence E., Jr. (24.10)

Because man is a social animal who accumulates an extensive culture and lives in complex societies, a very significant proportion of the human environment is made up of the people who surround a man, and the society of which he is a member. His interaction with these "social" and "personal" aspects of his environment is fundamentally communicative in nature. In-

formation from this part of his environment, obtained through his sense organs and evaluated in his central nervous system, leads him to display patterns of gross behavior of organ function which may significantly influence the course of his disease, or the circumstances of its occurrence.

Transmission

Etkin, William (24.11)

In the behavior of lower mammals the motivation and the action patterns generally seem as fixed by genetic determination as in lower vertebrates. However, the relation of the stimulus to the activation of the behavior seems generally much more complex and more subject to modification by experience. In culturally determined behavior, as I see it, the manner of expression of a drive as well as the stimuli eliciting such expression are largely determined by social learning, that is, by example furnished by other members of the group. The motivational factor energizing the behavior, however, may still be largely dependent upon genetically determined physiological processes. In this concept, man's motivational organization is basically innate, that is to say he shares with other vertebrates such drives as territory, status, sexuality, socialization, and learning. He differs from lower mammals primarily in that the manner of expressing such motivation is determined by social learning.

Skinner, B. F. (24.12)

In general, the evolution of man has emphasized modifiability rather than the transmission of specific forms of behavior. Inherited verbal responses are fragmentary and trivial. By far the greater part of behavior develops in the individual through processes of conditioning, given a normal biological endowment. Man becomes a social creature only because other men are important parts of his environment. The behavior of a child born into a flourishing society is shaped and maintained by variables, most of which are arranged by other people. These social variables compose the "culture" in which the child lives, and they shape his behavior in conformity with that culture, usually in such a way that he in turn tends to perpetuate it. The emergence of a given form of social behavior from nonsocial antecedents is exemplified by imitation. An inherited repertoire of imitative behavior in man is insignificant, compared with the product of certain powerful contingencies of reinforcement which establish and maintain behaving-as-others-behave. Most social behavior arises from social antecedents. Transmission is more important than social invention.

Educability

Dobzhansky, Theodosius (24.13)

The crucial adaptation in human evolution has been the ability to learn a great variety of ideas and to make a great variety of inventions, not to learn fixed ideas and only a certain invention. It seems to me on the whole more likely that natural selection has established in man a drive toward what Maslow denotes as "self-actualization" and avoided fixation of the means whereby the self-actualization may be achieved. Waddington steers clear of the pitfalls in which previous theories of evolutionary ethics were trapped. He recognizes that natural selection has provided man not with ethics and values but with a capacity to acquire ethics and values. Values are products of human culture,

not of the human genotype. But in order to become an "ethicising being," man must be an "authority acceptor," a receiver of socially transmitted information. The process of evolution has produced a human species capable of entertaining ethical beliefs; the biological function of ethics is to promote human evolution.

Erikson, Erik H. (24.14)

Care is a quality essential for psychosocial evolution, for we are the teaching species. Only man can and must extend his solicitude over the long, parallel, and overlapping childhoods of numerous offspring united in households and communities. Once we have grasped this interlocking of the human lifestages, we understand that adult man is so constituted as to *need to be needed* lest he suffer the mental deformations of self-absorbtion, in which he becomes his own infant and pet.

Hulse, Frederick S. (24.15)

The inborn plasticity of the human phenotype is certainly one of the factors concerned. Our minds, too, are plastic and flexible. They are capable of developing the most diverse preferences, prejudices, and perceptions, all in accordance with the social group within which they are raised and trained. Indeed, educability is probably the most vital aspect of human plasticity, for it is intimately concerned with the development of human culture, and human culture is our true ecological niche. Orthoselection to improve the capacity for culture has been the most outstanding characteristic of human evolution. Variety, in truth, is a mark of mankind's success.

Deutsch, Karl W. (24.16)

Human beings are not "single-game" or "single-purpose" units. They are at the very least "multipurpose" units, and any single-purpose calculation is likely to underestimate seriously their over-all value. (Highest) purposes (are) the preservation of growth of "life," "mind," (and) "order in the universe."

Meaning

Vickers, Geoffry (24.17)

What distinguishes us from the primates whose biology so closely resembles our own is our greater capacity not merely to handle information but to develop the personal and cultural frames of reference which give this information meaning.

Gardner, John W. (24.18)

All that makes us most human—communication, self awareness, sympathy, conscience—is dependent upon interaction with other beings of our own kind. Man is in his very nature a seeker of meanings. He has throughout history shown a compelling need to arrive at conceptions of the universe in terms of which he could regard his own life as meaningful. He seeks conceptions of the universe that give dignity, purpose and sense to his own existence. But, renewal—of societies or of individuals—depends in some measure on motivation, commitment, conviction, the values men live by, the things that give meaning to their lives.

Becker, Ernest (24.19)

To lose self-esteem, to lose a "game," and to lose an object, are inseparable

aspects of the loss of meaning. Meaning is the elaboration of an increasingly intricate ground plan of broad relationships and ramifications. It is the establishment of dependable cause-and-effect sequences which permit ego-mastery and action. Meaning is at the heart of life because it is inseparable from dependable, satisfying action. Man's symbolic life is an imbibing of meaning and a relentless creating of it. This symbolic elaboration of meaning is *Homo sapiens*' "home brew," so to speak, brought by him onto the evolutionary scene and manufactured solely for his use and delight. By means of it, man intoxicates himself into the illusion that his particular meaning fabric, his culture's concoction of symbols and action, is god-given and timeless.

Yarmolinsky, Adam (24.20)

A movement that focuses on moral goals, no matter how noble, without addressing itself to the institutional means to achieve these goals, reflects neither a meaningful commitment to morality nor a practical hope of improving the human condition.

Ethics

Erikson, Erik H. (24.21)

The moral sense, in its perfections and its perversions, has been an intrinsic part of man's evolution, while the sense of ideological rejuvenation has pervaded his revolutions, both with prophetic idealism and with destructive fanaticism.

Simpson, George Gaylord (24.22)

In the evolutionary context, the problem really becomes one of why organic evolution produced an animal capable of cultural evolution and of the ethicizing that helps to mediate cultural progress. There is no real doubt that the capacity, or, one can say, the necessity for ethicizing is in fact a *biological* characteristic of the human species developed by natural selection because it is adaptive for that species. In general biological but nontechnical terms, the direction of human adaptation early became one depending on individual flexibility with mainly learned abilities, with alternatives of action and necessary choices among them, with foresight as to the results of action, and with consequent responsibility for those actions. This kind of adaptation has always been carried out in a cooperative social milieu. It follows inevitably that men must and do learn, both from their fellows (parents, elders, priests, etc.) and from their own experience and introspection, to consider some actions "right" and some "wrong."

Huxley provides criteria for improvement by exemplifying it, notably as "evolution towards greater capacity for feeling, knowing, willing and understanding." However, this concept of improvement, and of evolutionary progress is strictly *ad hoc.* Among all the millions of living species, it is fully relevant to only one: *Homo sapiens.* It may also apply in part and with rapid dilution to a few of man's closer or more distant relatives among the higher vertebrates. It is not a general tendency in evolution, but a tendency limited to a very small minority of evolving organisms and fairly continual in late phases of the ancestry of a single one only. An ethic so derived is not based on the nature of evolution but on the nature of man. A workable naturalistic ethics is derivable not from the evolutionary process in general, but from the evolutionary status of man in particular.

Fulfillment

Thompson, Laura (24.23)

Mankind, through its propensities to create and evolve cultures and micro-races, is unique as earth's only organic species endowed with the power to develop its own potentials for freedom. This may be accomplished by means of community processes whereby each human group so builds its culture, within the limitations of its organic heritage and its existential situation, into institutions, behavior patterns, attitudes, and values, to afford its members opportunities for optimum self-fulfillment as human organisms.

Becker, Ernest (24.24)

For man, the esthetic object is the consummatory object; contemplation of the esthetic object draws the multiple fragmentations of felt experience into one fused whole. The esthetic object embodies, in one moment for all to see, the vision that fulfillment is possible.

Entering into the World-Environment Process

Crow, James F. (24.25)

Man is unique in that most changes in the environment are of his own doing.

Weatheral, R. (24.26)

"It is the great prerogative of Mankind above other Creatures, that we have also the power of considering, comparing, altering, assisting, and improving them" (*i.e.* the "marks of Nature") "to various uses." Thus did Robert Hooke open the Preface to his Micrographia, published in 1665.

Lee, Douglas H. K. (24.27)

The very gift which lifts him above the subhuman forms, the ability to operate upon instead of merely adjusting to his environment, contains the seeds of its own destruction.

Cowan, Ian McTaggart (24.28)

It is the unique revelation of man that he is not only consciously sensitive to his own environment, but also relates himself to much larger and more complex processes in which he plays a part. His image of the world then becomes an important element in the process of the world itself.

Boulding, Kenneth E. (24.29)

The manifest processes are those in which the awareness of the process itself—that is the image of the nature of society and the social processes in the minds of men—plays a significant role. With man comes self awareness and awareness of a whole system in which the self is imbedded. Therefore, the image of the world possessed by its human participants is a vital element in the overall dynamics of the system. We cannot tell what the system will do unless we know what the people in it think of it, for what they think affects their behavior and their behavior affects the system.

Dobzhansky, Theodosius (24.30)

Man is not the center of the universe physically, but he may be the spiritual center. Man and man alone knows that the world evolves and that he evolves with it. By changing what he knows about the world man changes the world that he knows: and by changing the

world in which he lives man changes himself. Changes may be deleterious or improvements; the hope lies in the possibility that changes resulting from knowledge may also be directed by knowledge.

Threat

Steiger, William A. (24.31)

Science's great accomplishment has been the utilization of the conceptual separation of body and soul, object and subject, a separatism which cannot be made in reality. This conceptual separation allows man to be viewed as any object, and thus to be weighed, measured, dissected and analyzed. For example, the performance of a blood sugar in a patient is not basically different from measuring the carbon content of a piece of steel. Now, unfortunately, this view of man as an object has become more than a method of study, it has become man's view of man. Thus automation replaces one thing, man, with another, a machine; tranquilizers arise from the concept that man is a physicochemical machine.

Becker, Ernest (24.32)

The individual needs a feeling of primary value, and the experience of the exercise of his powers. We know further that when he does not have them, he tends to withdraw into his own fantasy world. Periods of being cut off from the external world deprive the individual of the ability and the desire to cope with it.

Boulding, Kenneth E. (24.33)

One sees a distant trap—the trap of inanition. Man is a profoundly problem-solving animal. He reacts best to situations of challenge and difficulty. If he succeeds in solving the problems which now so thoroughly possess him, will he not in the very moment of his success die of sheer boredom?

The Future Seeker

Wagar, W. Warran (24.34)

Man by nature is a prophesying animal. "Farther than any other creature, man lives in the future; the effectiveness of his living depends on the sagacity of his forecast." (Hocking, The Coming World Civilization)

Becker, Ernest (24.35)

An animal with distance receptors like sight and memory has much greater spans to bridge in order to bring itself into satisfied contact with the world. On the human level the task of attaining satisfaction is prodigious. The ordinary separation of subject and object is pushed to a point of extreme complexity. Man is presented with a whole new range of integrative problems: time, space, identity, anticipation, hope, belief. For a symbolic animal integration is immensely complicated. The use of symbols in coping with the world magnifies the problem of a straining organism. Dualisms are felt in several areas. There is a difference between the private motive and the social motive; the "inner pole" of the self and the "outer pole" are not congruent. We may feel either hopelessly separated from the social—as in loneliness; or, we may feel helplessly monopolized by it—as in shame. Finally, there is the often deep antagonism between old rules and new experience. None of these are absolute dualisms. But they are felt dualisms. The self-conscious symbolic animal, furthermore, feels

them very keenly. This complex of strains, tensions, drifts, antagonisms, plagues man like no other animal in nature is plagued. Modern man is slowly realizing that symbol-systems *should be turned upside down and inside out:* that they were made precisely for that, that man's business is precisely to *become.*

Laswell, Harold D. (24.36)

Among the advanced forms of life, human beings, at least, are relatively distinguished by discontent with "solutions." This inner-generated discontent presumably comes from the intricacy of the brain, the body, and the sociophysical environment.

Rapoport, Anatol (In Hoagland and Burhoe, Eds.) (24.37)

The most characteristic human creative thing about man's uniqueness is his ability to deal with dilemmas by getting outside of the dilemma situation by a radical re-examination of the evaluating process, of the language, of the metaphysics, of the philosophy, of the framework of assumptions—whatever has led to the dilemma in the first place. Instead of our trying to patch it up, we are sometimes given a beautiful opportunity to make an entirely different kind of formulation in which the dilemma becomes resolved.

Erikson, Erik H. (24.38)

Man's socio-genetic evolution is about to reach a crisis in the full sense of the word, a crossroads offering one path to fatality and one to recovery and further growth. But the processes of socio-genetic evolution also seem to promise a new humanism, the acceptance by man—as an evolved product as well as a producer, and a self-conscious tool of further evolution—of the obligation to be guided in his planned actions and his chosen self-restraints by his knowledge and his insights.

Becker, Ernest (24.39)

Space, too, is of two kinds: a habitual action space, circumscribed by the individual's body movements; and an abstract, measured, conceptual space: the kind we draw on a map, or conceive as the shape and bounds of the cosmos. Many primitives have built the action space of their home territories solidly into their every movement. Lived, action space is built into the organism by behavior; distance spanned by habit becomes part of the organismic expectancy and rhythm. Conceptual space too becomes part of our cognitive world; but even though we have the road map we are strangers until we have traveled the road. The development of abstract categories of space and time, in the center of which the individual places himself, is unique in nature.

World Brain

Lord Brain (24.40)

Many years ago, H. G. Wells pointed out the need for what he called a 'world brain' to correlate information and extrapolate it on the world scale, and I hope that one day we shall achieve something like that. As individuals, we are all receptors, capable of supplying the higher centers with information. What information they get, therefore, depends upon us. We are also the motor nerves, and what society does is done by us. But we are again, collectively, ourselves the higher centres, the forebrain, which mediates for the social mind the difficult task of receiving the information, learning from past experience,

reacting to it emotionally, yet controlling its emotions, and, above all, looking to the future.

Dobzhansky, Theodosius (24.41)

[Teilhard de Chardin] chose to designate the direction in which evolution is going as "The Point Omega." This is "a harmonized collectivity of consciousness, equivalent to a kind of superconsciousness. The Earth is covering itself not merely by myriads of thinking units, but by a single continuum of thought, and finally forming a functionally single Unit of Thought of planetary dimensions. The plurality of individual thoughts combine and mutually reinforce each other in a single act of unanimous Thought."

Dryer, Bernard V. (24.42)

There is now underway a widespread effort to create a set of common notations, a symbolic language, to express whatever analogies we can make between many actions of the human nervous system and the activity of computers. With this convergence of mathematical physics and neurophysiology, we have a kind of intellectual sandwich—one half of which is covered by words from the world of electric circuitry, such as input, output, redundancy, feedback, and channel capacity—the other half of which, perhaps more familiar to most of us, from the neurophysiology laboratory, such as facilitation, recruitment, summation, and refractory period.

ENVIRONMENTAL CHALLENGE

When these comments are considered in conjunction with other knowledge of the evolution of man, it is apparent that a great deal of the uniqueness of the human animal, including all the complexities of modern culture, results from exploitation of pre-adaptive genetically-determined capacities that characterized our hunter-gatherer ancestors of fifty thousand years ago. All animals, particularly many species of highly social mammals, have capacities for adjusting to situations not previously encountered. If we are to make studies with mammals most fruitful for gaining insight into phenomena expressed on the human level, it follows that such studies must confront the animals with environmental conditions their species have never encountered before. This increasing complexity of the environment should particularly focus on enhancing opportunities for communication, increasing freedom and diversity of choice, demanding higher levels of diversity and complexity of behavior, reinforcing cooperation, establishing values and diversity among them, facilitating learned imitative behavior, and providing opportunities that foster group cohesion. Then, given the limitations of neural capacity, perception and motor abilities, it is possible to gain insight into the processes through which changed environmental circumstances interact with the pre-adaptive capacities of the species to produce higher levels of social organization and information "metabolism."

Only in the context of such studies can studies on mammalian physiology, including neurophysiology, gain their maximum relevance to man. For example, in so long as we conduct physiological studies of laboratory animals on subjects reared and maintained in the barren confines of cages, any results from them should only be applied to humans similarly reared in a social and environmental void. It is a common property of most genes that they affect several avenues of phenotypic expression (pliotropism). Some genes influence rate

of growth, but this does not rule out their influence through other metabolic pathways on social behavior. In closing, I wish to reiterate that, though I recognize that mice, and rats, and cats and monkeys are not human and are certainly not capable of developing our complex culture, many species are capable of exhibiting quite complex societies and complex learned behavior with respect to their physical environment. Exploiting these capacities, beyond their normal expression in the environments where the species have evolved, will mark a new era in the contribution of animal studies to human welfare.

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Vitamins[1] (except A)	gms./100 kilo
Cod liver oil U.S.P.*	500.00
K (menadione sodium bisulfite)*	100.00
E (DL alpha tocopherol N.F.)*	25.00
E (DL alpha tocopherol acetate N.F.)*	25.00
B (nicotinic acid)*	7.50
D concentrate	2.75
thiamine hydrochloride	0.50
riboflavin	0.75
pyridoxine hydrochloride	0.63
calcium pantothenate	5.00
choline hydrochloride	250.00
p-amino benzoic acid	6.00
biotin	0.03
folic acid	0.05
niacinamide HCL	3.75
B_{12}	0.01
ascorbic acid	50.00
inositol	25.00
	1001.97

[1] All weights except those followed by an asterisk based on Table I, p. 403 of Greenstein, Jesse P., Sanford M. Birnbaum, Milton Winitz, and M. Clyde Otey. Quantitative nutritional studies with water-soluble, chemically defined diets. I. Growth, reproduction and lactation of rats. Archives of Biochemistry and Biophysics, 1957, 72, 396–416.

Remainder of diet (except Vitamin A)	% of 99 Kilo Remainder
Vitamin free casein	18
corn starch	30
sucrose	30
Crisco (fat component)	10
alphacel	8
H. M. W. salt mixture[1]	4
	100

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My Debt to Osler[1]

By THOMAS M. DURANT, M.D.[2]

The great Sir William Osler died in 1919. As a child at that time, I knew nothing of this man's existence, nor did I until much later when I was a medical student. Ever since then the impact of his life on mine has been an immeasurable asset to me. My indebtedness to him is great and it is of this debt I wish to speak tonight in my Presidential Address. It is a debt I can never repay. I hope I can, however, impart to the younger generation by example and teaching some of the spirit of this great man. I feel, as did Dr. Wilder Penfield, that his synthesis of the spiritual and scientific aspects of medical practice is more needed today than ever before.

My own contact with the Oslerian influence began, as I have said, in my student days. At that time, soon after my marriage, my wife gave me a copy of Cushing's *Life of Sir William Osler.* If I had received it earlier I could have spent my honeymoon, as did Osler, reading Newman and Jowet's *Plato*, as well as quotations from "The Idea of a University" from *The Republic*! I don't know how Mrs. Osler liked his absorption with such scholarly tomes at such an early period in her marriage, but I don't think I would have lasted long under similar circumstances! I must admit that I was 19 years younger than he was, however, when I married! And, speaking of honeymoons, I think it was a good idea that I didn't do what Dr. Franklin Paddock is reputed to have done immediately upon his return from his honeymoon. He is supposed to have said to his wife, "My dear, I think I'll just drop over to the office for a few minutes". Mrs. Paddock said that he really never returned!

Through the years since I received the Cushing volume I have come to consider it among the most valued and indispensable books in my library, along with *Aequanimitas and Other Addresses* (of Osler's). They are heavily underlined and the margins black with notes. Whenever my mitochondrial batteries are depleted, reading these volumes provides a remarkable supply of exogenous repletion.

You will remember that Cushing's *Life* received the Pulitzer Prize for Classical Literature. Webster's definition of a classic follows: "Of the highest quality or rank; having recognized or permanent value; of enduring interest or appeal." This definition clearly fits Cushing's book. In addition it has the merit of serving varied needs in varied periods of one's life and bears reading and rereading. Early in my medical life I was tremendously impressed by Osler's knowledge of and frequent quotation of classical literature. This knowledge must have been important in shaping his noble character, his personality and his humanitarianism. Furthermore, it must have contributed a good deal to the clarity and the artistry of his speeches and writings. I found myself wishing that I had launched early in life on a similarly extensive study of great literature. I have tried hard to correct for this, but Osler's influence came a bit too late, I'm afraid.

Osler called himself a "notebook man," and I have learned that it is indeed valuable to follow suit in my own

[1] Adapted from the Presidential Address presented at the Annual Meeting of the American Osler Society, Chicago, Illinois, 12 April 1973.

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reading. I have had one special difficulty, though—learning to discipline myself, as he did, by spending specified hours regularly in the library.

Osler was truly a bibliophile. There is a story apropos of this that has intrigued me. The late Dr. Roger Lee tells of having made an unexpected call at the Osler home in Baltimore. Mrs. Osler told him that her husband had cancelled all appointments for the afternoon because of a chill. She was sure, however, that he would want to see Dr. Lee. When ushered into the room of the supposedly sick Osler, Dr. Lee found him looking very well, propped up in bed reading, and surrounded by a supply of new books which had just arrived that day!

I have wondered whether Osler's example has had an influence on those who have prepared presidential addresses for our elite Internal Medicine Societies like the Association of American Physicians and the Clinical and Climatological Association. I have recently re-read a series of these, and there seems to be an increasing trend toward basing them on the classics. I give you as a few examples Dr. Barry Wood's talk based on Goethe's *Faust*, our own Dr. Harvey's on Sydenham and Cervantes and Cecil Watson's on Gibbon's *Decline and Fall of the Roman Empire*. Dr. John Minor, interestingly enough, based his on a passage from the Westminster Shorter Catechism!

Osler's knowledge of the Bible has astounded me and put me to shame. You may recall, perhaps, that Milburn, a classmate of his in his early days, remarked that even when at Barrie, Osler was "notably proficient in the greatest of Books." Cushing writes, referring to Osler's knowledge of Tichner & Field's *Edition of Completed Works*, "only one other book did he know more nearly by heart—the Bible." Examples of this memorization are found throughout Osler's speeches and writings. One bit of evidence that especially surprised me, since it was so "off the cuff," was his reply to a student when he, Osler, asked him what had happened to the student's classmate, Ephraim. The student replied that Ephraim was not coming back to college, adding that he had fallen into evil ways. Immediately Osler retorted, "Ah, Ephraim is joined to his idols," a quotation from the book of Hosea. The student, who was also evidently familar with the Bible came back at him with a quotation from the second epistle of Peter: "The dog has returned to his vomit and the sow that was washed to her wallowing in the mire." Osler smiled and replied, "Good Scripture, Donald, but rough Anglo-Saxon!"

Osler's profound knowledge of the Bible and his awareness of Jesus' warning, "Work for the night is coming," must have had some influence in making him an indefatiguable worker throughout his life. I am sure also that it was a factor in giving us such a great humanitarian as a physician, like Luke, "the beloved physician." I am sorry to say that students today are almost unbelievably lacking in their knowledge of Scripture. This may be a factor in their present trend toward materialism and away from more spiritual attitudes in medical practice.

Turning from the sublime to more mundane matters, I recently came across a note I had made some years ago in the margin of a Cushing page. The text at this point referred to a time when Osler said he was "still camping in two rooms and did not wish to leave Madam in all the wrack and ruin of painters, plasterers and paper hangers." It evidently comforted me to think that a great man could be frustrated by such petty problems, for my note said, "read on 1-14-61, when my house is in a similarly sad state." Another source of comfort

for me was Osler's reference to "those infernal proofs" which he was correcting. I suppose it is a common annoyance for physicians to be irritated by the tedious necessity for proofreading papers and books they have written.

Although Osler was a prodigious worker, I have been comforted to find that he took and enjoyed vacations. One of these was at a peaceful spot where there were no telephones, but a glorious coast, bathing "chez nous," and perhaps more important than anything else, "not a soul to speak to." Apparently solitude was often important to Osler, as it should be to us. I think, in this connection, of Anne Lindbergh's stay alone on Captiva Island in Florida, where she wrote that very thought-provoking book, *Gift from the Sea*, in 1955. In this she urged the reader to "relearn to be alone." She went on to say, "There is a quality of being alone that is incredibly precious. Life rushes back into the void richer, more vivid, fuller than before. It is as if, in parting, one loses an arm, and then, like the starfish, one grows it whole again, complete and round, more whole than before." I am sure that if Osler had heard this he would have reminded us that Jesus often withdrew to a desert place for solitude, to pray and to be refreshed. He would have remembered Wordsworth's caution that "The world is too much with us, getting and spending, we lay waste our powers."

Obviously vacations and solitude accounted for only a small portion of Osler's life, unless we count the hours spent in libraries as solitude. He spent most of his time and contributed most in the academic field. He, primarily, shifted the medical student from the amphitheater to the bedside and to the laboratory. Today we accept the advantages of this shift, which gives the student increasing amounts of responsibility and benefits both him and the patient. Apparently it took an Osler to reestablish permanently the old Boerhaave method in America.

The advice to physicians and medical students contained in Osler's collected addresses is as valuable today as it was in his own time. I am sorry that students no longer receive complimentary copies of *Aequanimitas*, as they did when I was graduated. It is an invaluable little volume. Naturally, Osler's textbook of medicine is out of date now, but it remains a literary gem and a shining example of how broad one man's grasp of a subject can be. It was remarkable enough to arrest the attention of Mr. Gates of Chicago University and to lead indirectly to the establishment of the Rockefeller Foundation! I believe we owe a great debt of gratitude to Drs. Harvey and McKusick for the publication of that very valuable volume, *Osler's Textbook Revisited.*

Osler's prophetic insight also deserves some comment. Dr. Ray Pruitt has pointed out Osler's uncertainty about the validity of full-time versus part-time teaching in medical schools. It is clear in Osler's writing that he foresaw two situations which have become too common in academic medicine today. The first of these is the prevalence of clinical teachers who have never practiced medicine "on the firing line." Many physicians have told me that medical school failed to prepare them for practice outside the "ivory tower." They had learned to view John Doe as a collection of enzyme systems and electrophysical phenomena. To the extent that this was true their education was satisfactory. They found to their dismay, however, that they had not come to know him as the true John Doe, a total human being.

The other defect which Osler foresaw was the trend toward super-specialization, itself a real necessity in modern medicine, but one that lures too many

students away from becoming what he called "Polymath Physicians," or "specializing generalists." I think his terms could be used to apply to the internist who retains his interest in and his ability to care for the whole man-body, soul and spirit. This generalist should of course, call upon the super-specialist when needed, but would work with the latter as a co-specialist. Osler warned in his address, "The Student Life": "Concentration has its drawbacks. It is possible to become so absorbed in the problem of the 'encliticde,' or the structure of the flagella of the Trichomonas, or the toes of the prehistoric horse that the student loses the sense of proportion in his work and even wastes his time in researches which are valueless because they are not in touch with current knowledge," or, I might add, current practice. Could Osler possibly have foreseen the days of vast government grants? I don't deny the "usefulness of useless knowledge," nor did Osler, and I certainly don't mean that students should not have research experience. I do mean that there should be a proper balance so that those who will practice medicine—the majority of graduates—are properly prepared for it, while keeping and maintaining an inquisitive attitude toward the mysteries of life.

Osler's writings concerning the aging process are priceless, I think. At least they have been of great comfort to me as I have passed through the various phases of my life. First, speaking of "La Crise de Quarante Ans," he says, "Insensibly in the fifth and sixth decades there begins to creep over most of us a change, noted physically among other ways, in the silvering of the hair and that lessening of elasticity which impels a man to open rather than to vault a five-barred gate! It comes to all sooner or later; to some only too painfully evident, to others unconsciously, with no change perceived. And with most of us this physical change has its mental equivalent, not necessarily accompanied by loss of application or of judgment; on the contrary, often clearer, and the memory more retentive, but the change is seen in a weakened receptivity and in an inability to adapt to an altered intellectual environment."

Fortunately, Osler gives us more than just a beautifully worded description of the aging process. He deals also with therapy. "The only safeguard against this lamentable process," he says, speaking to teachers, "is to live in and with the third decade, in company with younger, more receptive and progressive minds." Later on, aged 56, he spoke of the "Fixed Period," and said, "Herein lies the chief value of the teacher who has passed his climacteric and is no longer a productive factor—he can play the man midwife as Socrates did to Theaietetus, and determine whether the thoughts which the young men are bringing to the light are false idols or true and noble births." He adds, "Only those who live with the young maintain a fresh outlook on the new problems of the world." For the general practitioner he advises "a well-used library as one of the few correctives for the premature senility which is so apt to overtake him." I can testify that these wise words have been of great reassurance and value to me. I have been continually refreshed by "morning report" sessions with residents and by teaching rounds with students and house staff. We all know that Osler's latter years were very productive. I'm sure that the application of his own advice to his own life contributed to this.

In conclusion, I believe it is safe for me to say that Osler was one of the greatest "inseminators of other minds" who ever lived. W. W. Keen, the great

Philadelphia surgeon, said that "wherever he went the wheels began to go 'round, things began to be done and all for the good of the profession and community. The dry bones of Ezekiel's Vision gathered themselves together and became imbued with active life. The diligent were encouraged to become more diligent, the slothful were shamed into activity. He was a fount of inspiration. His personal influence extended more widely and to better purpose than that of almost anyone I have ever known."

I pray that it may always be the goal of the Osler Society to perpetuate and extend the influence of this great man—truly a gift from God's hand to mankind.

Deformity Is a Disease[1]

By MILTON T. EDGERTON, M.D.[2]

We are gathered here today to celebrate the birthday of an English gentleman who was born in Lancashire, England, on May 21, 1881. Happy Birthday Robert Henry Ivy! Two of Dr. Ivy's uncles served on the side of the North during the Civil War and one of those uncles, Matthew H. Cryer, at the age of 35 came to Philadelphia to study dentistry and medicine, getting his D.D.S. in 1876 at the Philadelphia Dental College, now a part of Temple University, and his M.D. in 1877 at the University of Pennsylvania. It is not surprising to discover that the Ivy branch of the family contained substantial representation in the ministry—perhaps accounting for Bob Ivy's liquid use of the English language and stern air of judgment when he served as an examiner of aspiring young plastic surgeons.

Dr. Ivy's father, after obtaining a dental degree at the Philadelphia Dental College, returned to England and brought young Bob—then 6 years of age—to this country for his first visit. A year later the Ivy family moved to Shanghai, China, where Bob, along with his sister and brother, had their first introduction to the Far East. Bob's father soon sent him back to Emanuel School in England where, in 1891, as a boarder he was known as "Ching" Ivy. We can imagine him actively involved in the track and field games, playing cricket, or leading the choir until he reached an age when his voice changed. A review of the Emanuel School records reveals that Robert Ivy was an advanced and outstanding student in chemistry despite the fact that he spent a good bit of time playing "fives"—a game much like American handball. Typically, Bob Ivy has continued to maintain his ties in recent years with the Emanuel School.

In 1897 Dr. Ivy spent approximately six months in south central France, becoming more skilled in the French language and seeing first hand—with considerable excitement—some of the ruins of ancient Roman civilization. He even enjoyed the thrill of seeing Queen Victoria riding in her carriage at Nice. As one might imagine, when in 1898 after these cosmopolitan experiences, the 17-year-old Ivy entered the School of Dentistry at the University of Pennsylvania, he was already an extremely sophisticated young man. His uncle, Dr. Cryer, was the professor of oral surgery in the dental school and also had obtained a medical degree. The example set by Dr. Cryer helps explain why Dr. Ivy, in subsequent years, has been motivated to bring together the finest knowledge of both dentistry and medicine regarding the field of oral and maxillo-facial surgery. Dr. Cryer's classical book, *Internal Anatomy of the Face*, was published in 1901 and still is of great value to medical scientists.

On leaving dental school in 1901, Bob Ivy became an intern at the Philadelphia General Hospital, working on what was probably the first hospital-based dental service in the United States. He tells us that his difficulties in trying to insert tin foil fillings into extracted teeth were so

[1] Annual Robert Henry Ivy Lecture III of Temple University, presented at The College of Physicians of Philadelphia, 21 May 1973.

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frustrating that he was persuaded to consider going on with the study of medicine following his dental training. There followed interesting years with another trip to Shanghai, a return to Philadelphia for internship and residency training, followed by his meeting, courtship, and marriage to a lovely Canadian nurse in training, Norma Crossland. The marriage was in 1912 and their first child, Cynthia, arrived just after Christmas in 1913. Shortly afterwards the Ivy family moved to Milwaukee where Dr. Ivy's practice began to concentrate on surgery of the face, mouth and jaws.

It is a matter of military history now that in 1917 Dr. Ivy joined Major Vilray P. Blair in the Office of the Surgeon General in Washington to organize a subsection of plastic and oral surgery for the care of war injuries of the face and jaws. Many such injuries were anticipated with the entrance of the United States into the war. As a result of the efforts of these two men, some of the first interdisciplinary surgical-dental teams were formed to deal with all aspects of injuries to the face and jaws. This pattern was used again in World War II with considerable success by our military surgeons. Base Hospital No. 115 at Vichy, France, became one of the first special hospitals for the care of head, face and jaw injuries.

The years that followed the war were full of rich professional experiences and contributions and saw the return of the Ivy family to Philadelphia with teaching at the University of Pennsylvania. Here he met Sir Harold Gillies on a visit in 1920 and throughout his life he continued to enjoy a close friendship with this great pioneer British plastic surgeon.

In his attempt to build a practice, Bob Ivy found that the young would-be specialist in plastic surgery had to wait years before many of his colleagues would recognize his interests and skills. That is still true today. In 1932 he started a one year teaching residency in maxillofacial surgery at the Graduate Hospital. This ultimately developed into a full residency program in plastic surgery in 1944. At that time Dr. Ivy was appointed Professor of Plastic Surgery in the School of Medicine. Dr. Ivy, in quoting Vilray Blair, notes: "The term, plastic surgery, essentially does *not* include treatment of *disease*, but one who has made some special study of plastic principles may be better equipped to care for certain maladies than some who have not deeply concerned themselves with the technical details of mass tissue transplantation."

"Certain of the psychoses due to consciousness of deformity or the presence of an objectionable feature can often be quickly and permanently relieved by a proper surgical correction." These words reveal a very early insight into the role of deformity in affecting the total function of the affected individual.

Since much of the remainder of Dr. Ivy's life has been dedicated to an appreciation of the need to correct deformity, it would be appropriate for us to look more closely this afternoon at the role deformity plays in the total health care picture of our nation.

Perhaps the most understandable definition of "health" would be simply "the absence of disease." Disease, in turn, may be seen quite literally as a "lack of ease." This lack of ease may be physical, psychological or social.

Webster's Dictionary defines disease as "a condition in which bodily health is impaired," or "any sickness, illness, malady, or ailment."

Since "deformity" represents abnormal form or shape of some bodily part, it defines a condition in which there is a

physical abnormality or alteration having both psychological and social impacts. Surely, deformity is thus recognizable as a form of "disease" interfering with the state of health.

What are the undesirable effects of deformity? Interestingly, deformed people are almost always placed by other more normal persons into a type of minority group—a group with special needs and special problems. They are literally "set aside" by more normal people.

All of us recognize that individuals who feel deformed do not function well in their jobs or relationships with others. Such individuals show the effects of diminished self-confidence, often feel unloved or even unlovable and may experience the physical signs of depression or anxiety, such as slowing of the pulse, reduced metabolic rate, digestive disorders, distractibility, or loss of interest in surrounding activities.

But *how*, you may ask, do we *measure* deformity? It is obvious that there must be *some* degree of anatomical or objective change from the norm and it is usually implied that this change is visible and noteworthy to the average observer. However, it is clear that some people with very severe anatomical deformity function quite well in their jobs, in their family relationships and in society in general. Others with very *minimal* anatomical change are *totally* disabled by the resulting "sense of deformity." Indeed, if this subjective self-image is totally unacceptable to the patient, he will be burdened with overwhelming inhibitions that may, at times, be almost paralytic. Thus, we see, not uncommonly, patients with small anatomical defects suffering from major upsets in their individual self-imagery. This grossly affects their function. It becomes clear that this *subjective* measurement of deformity by the affected individual is much more important to society and to that individual than the *actual anatomical* deformity.

Yet again we must ask how we may measure the damage to self-esteem or self-image if this is recognizable as the *medically* important factor in the assessment of deformity? The plastic surgeon uses several common sense indicators in judging the impact of deformity on individual patients who seek his help: These include: 1., repeated and consistent descriptions or statements of the patient as to the way in which he views his own deformity; 2., the actions or conduct of the patient, for example, the tendency for him to cover the deformed feature with his hand or hat, turning away to avoid presenting a profile, shyness with strangers, or general inhibitions of behavior; 3., professional interviews with surgeons, psychiatrists, or psychologists to detect the motivational patterns which lie behind the patient's desire to correct a deformity by surgery; 4., psychologic self-testing techniques that may more completely spell out the patient's concept of his physical self; 5., statements by relatives and associates concerning the patient's view of his own deformity; 6., the very willingness of the patient to submit to the discomfort, inconvenience, and cost of surgery is good evidence that he feels quite disturbed by his image; 7., finally, the surgeon relies on physiognomic implications drawn from data with other patients having similar deformities. Using these and other indices, most plastic surgeons may assess the sense of deformity of an individual patient with reasonable reliability, but it is difficult to document these measurements in a scientific fashion.

What may we ask is the attitude of society in general toward the individual with deformity? We have already mentioned that many individuals with a

deformity are subconsciously placed in a "minority group" or special category by normal individuals. Many in our country seem convinced that "character" is built by hardship or suffering. Thus, deformity, in a way, becomes "God's will"—and something to overcome—but *not* to be corrected.

Some who complain about their appearance are criticized as "vain" and are made to feel guilty, selfish or self-indulgent if they seek to use money or a doctor's time to correct deformity.

Medical insurance companies add greatly to the public climate of impatience with deformity by stating explicitly in many policies that they refuse to "cover surgery for cosmetic purposes." The individual who is deformed or ugly thus comes to feel that in some way it is "weak" for him to seek surgery for anything so trivial as improvement in appearance—even though that deformity may be destroying the effectiveness of his life and that of others around him.

Despite these critical views by society, there are many inconsistencies evident to all of us. Certain deformities are accepted without question as a true disease or at least an important health problem. An example would be that of the child with a cleft lip deformity or a young woman whose cheek has been scarred by an automobile accident. In contrast, the child born with a lop ear deformity or a woman requesting a breast replacement when her own breast has been removed for cancer will be told by insurance carriers that such "plastic surgery" is not covered because it is for "cosmetic purposes only." Interestingly, even a disease of the skin resulting from glandular hyperactivity and secondary infection such as acne is also considered a cosmetic problem and the cost of correction of the resulting deformity is not covered, to my knowledge, by any insurance company. Such arbitrary distinctions by medical insurance companies include great inconsistencies in regard to whether a given deformity is congenital or acquired, symmetrical or asymmetrical, primary or secondary to treatment of another condition, metabolic versus degenerative in origin. For example, a knobby arthritic joint on the hand may be shaped by the surgeon and will be medically covered by insurance, but a woman seeking a face lift for the ravages of sunshine and time will be excluded from such coverage. In neither case will the surgeon be asked "the sixty-four dollar" questions: "What impact does this deformity have on this particular patient's life and function?" and "What change in that impact may be anticipated by surgical correction?"

In 1964, Dr. Gerald Kaplan [*Principles of Preventive Psychiatry*, Basic Books, Inc., 1964, p. 113] introduced the term "tertiary prevention" as a method of health care aimed at reduction of the rate within a community of defective functioning due to mental disorder or to deformity. Thus, in the case of deformity, this term would include methods used to reduce the rate of the *residual* defect, the lowered capacity to contribute to the occupational and social life of the community which *continues after the deformity has ended.* Therefore, "tertiary prevention" seeks to return, by the use of surgery or other methods, the deformed individual to his or her productive capacity as quickly as possible and to his highest potential. Although plastic surgeons and psychiatrists have made considerable advances in the rehabilitation of individual patients in the past two decades, we are only "in the earliest stages of utilizing this knowledge in planned community programs for large scale reduction of the peculiar residual defect which is the essential ingredient of "tertiary prevention." We must constantly remember that rehabili-

tation of the deformed patient should start with the *diagnosis* and *not* with surgical treatment. The physician must be concerned with nothing more—and nothing less—than the *total welfare* and function of his patient and not stop with merely correcting his anatomical deformity.

Efforts must also be made in our society of the future to counteract the alienation due to prejudice. If a patient seeks or receives corrective surgery for deformity, he should not have to carry the burden of a whole set of additional stereotypes which negatively color the expectations of others about his values and his eventual return to productive life. Remember that plastic surgery has the tools to both "cure" and "prevent" many of the usual sequellae of deformity! We are just *beginning* to understand the impact of deformity on juvenile delinquents, chronic violators of the criminal code, and even school children who simply perform poorly in their studies within the school system.

The political pressures that are pushing us toward some form of national health insurance make it mandatory for doctors and laymen alike to address themselves to the role of deformity in the overall picture of the health of the nation. Are we convinced that the correction of deformity improves the functioning of the individual and of his society? Have you studied the evidence? Is it crystal clear? Are we prepared to take on the correction of all significant deformities as a justifiable expense to the nation's taxpayers? Would government-provided (seemingly "free") correction of deformity be less effective for total rehabilitation of the individual patient than is the current free enterprise system where such surgery requires significant financial sacrifice (input) on the part of the individual patient? If, because of cost, deformity is not to be included as a curable disease under the national health insurance progam, what other special medical conditions should be omitted? For example, at the present time, because of the expense involved, emotional disease and tuberculosis are generally not covered under most private health insurance programs.

Perhaps, as a specific example of the role of body imagery, a recent small study conducted by our group on the psychological factors involved in the reconstruction of the ear may be of interest. We interviewed for this purpose 60 normal non-deformed persons and asked them to describe their facial features. We selected the face as the most important part of the anatomy for appearance and personal interaction and we wished to determine if the normal person considered their ears as parts of the face. It was noted that 26 of the 50 subjects did include their ears as part of the face, males being somewhat more likely to do so than females. Although no subject mentioned his ears *first* as a facial feature, 2 of them mentioned them second, and 4 mentioned them third. Several adult patients in another group — all having ear deformity — complained that others frequently conclude on noting the deformed ear, that they must have a hearing problem. They reported embarrassment at loud conversation directed toward them by people making that false assumption.

On relating these observations to *children* with deformities of the ear, we found that frequently youngsters 4 years of age covered their ears by caps or hats or held their hands over them when at play with other children. Many times the identification of the ear as a deformed one was not fully appreciated by the parents until the child was old enough to come into contact with his peers who then rejected or ridiculed him as "different." This apparent cruelness on the part

of any normal child may simply represent a mechanism whereby he may increase his own confidence in his normality by pointing out another's deformity, thus emphasizing "my two ears are like everyone else's." Very quickly the parents of children with deformities of the ears (or other facial features) begin to show the parental attitudes of over protection, rejection, guilt, anxiety and depression. These important psychopathological attitudes substantially impair the self-image of the child. While the *family* reactions can be improved or modified by counselling, it is difficult to manage the reaction of *peers.*

When decisions are made to assist the child by offering surgical reconstruction of the ears, an important first step is established in improving the self-esteem and overall self-image of the youngster. The parents, by that very decision, feel emotional relief as they are able to express the fact that "finally something can be done." We have also learned that if the surgery can begin at about the time the body-image concept regarding ears is developing — and this is usually at the age of 4 to 5 — the child experiences less emotional upheaval by avoiding rejecting attitudes from other children, while at the same time he experiences added emotional support from his parents as they become more hopeful. Once the operation has taken place, the child has the additional option to blame any post-surgical residual deformity on the surgeon. He often will offer this simple explanation to his friends — in case he is questioned about the ear by responding — "the operations are not yet finished." If the operation is *not* performed at an early age and the child is allowed to experience additional years of continuing congenital facial deformity, the impaired self-image that follows is far more emotionally disabling than any personality problems that might develop from hospitalization at a young and tender age. The ear, of course, is only one example of the many deformities experienced by young children. Studies of deformities in other parts of the body show similar findings.

Physicians and laymen usually understand the reasons for turning to plastic surgery when the operation is of a reconstructive nature and when it is designed to improve *both* function and appearance. They tend to be less sympathetic and understanding of cosmetic (or esthetic) surgery, since such surgery may deal with relatively minor functional or anatomical problems and is designed almost exclusively for the correction of emotional problems. Thus, the family physician, who spends most of his time caring for people with organic disorders, is often puzzled when someone seeks his advice about possible plastic surgery for the correction of some apparently minor defect. If he fails to suspect how deeply that person feels deformed and inadequate, he may belittle the request for information and unknowingly, but permanently, lose the affection and friendship of his patient.

The rapid growth of plastic surgery provides overwhelming evidence that its appropriate use for emotional problems is indeed rewarding to the patient, his doctor, his family, and to society. Medical insurance programs usually do not cover esthetic surgery for the simple reason that by so doing, they would greatly increase the cost of their premiums. Insurance companies find it difficult to estimate the demand for this type of work that would follow such an extension of coverage. This should in no way suggest that such surgery is not vitally important to the patient.

The opportunity to address you on this happy occasion celebrating Dr. Ivy's birthday is an honor that I shall not soon

forget. Dr. Ivy has for many years been a hero of mine, not only as a surgeon, a scholar, a teacher, and a lawn-bowler par excellence, but also as a man of integrity, of warmth, wisdom, human understanding, and certainly one of our great warriors in the battle against deformity. I salute you, sir!

The Renin Axis in Causation, Prognosis and Treatment of Hypertensive Disease[1]

By JOHN H. LARAGH, M.D.[2]

THE HIGH BLOOD PRESSURE PROBLEM

Hypertension is a condition with devastating consequences. It is the most significant known risk factor in the development of strokes, congestive heart failure, atherosclerosis and renal failure. It is also one of the most significant of all predisposing factors for coronary heart disease and myocardial infarction. It is thus the leading single risk factor for causing all illness and death.

Although the precise etiology of every form of hypertension remains to be settled, it seems incontrovertible that several endocrine factors, and particularly those subsumed under the renin-angiotensin-aldosterone system (Figure 1) play a key role in all or most of them. Just as clearly established is the role of dietary salt. The central nervous system is also undoubtedly an additional factor, but its role is less well established than that of the others. So intertwined are these variegated factors that it is difficult at times to separate cause from effect in this tangled etiologic skein. Yet, when we begin to sort out the various strands that have been emerging over the past few years, certain basic patterns become quite clear.

The first of these is that essential hypertension, contrary to long held belief, is not a unitary syndrome, but a complex, biochemical multiform, one that may be categorized into three separate types on the basis of renin activity, another three distinct types on the basis of aldosterone levels, or a total of nine (theoretically) distinguishable types when the various possible permutations in renin-aldosterone relationships are taken into account. Significantly, eight of the nine theoretical variations have been seen clinically.

A second general pattern emerges when one considers two of the physiologic factors most immediately involved in the hypertensive process, that is, the degree of vasoconstriction and vascular volume. Looking at these, it is plain that hypertension falls into two polar groups, one in which excessive vasoconstriction (relative to volume) is the primary aberration and sustaining factor, a second in which excessive volume expansion (relative to vascular capacity) is the primary initiating and sustaining factor. Between these two extremes of the spectrum, lies a series of combinations of these two factors, or what might be termed a series of inappropriate summations of the two.

Both the two polar forms and the range of intermediate ones, we now feel, are explainable in terms of endocrine aberrations, albeit quite subtle ones. All of the merging patterns, moreover, apparently have important therapeutic and prognostic implications. The discovery that hypertension embraces a spectrum of conditions, each analyzable in terms of specific renin and aldosterone aberrations, offers in practice a more comprehensive understanding of the individual

[1] Nathan Lewis Hatfield Lecture L, The College of Physicians of Philadelphia, 9 May 1973.

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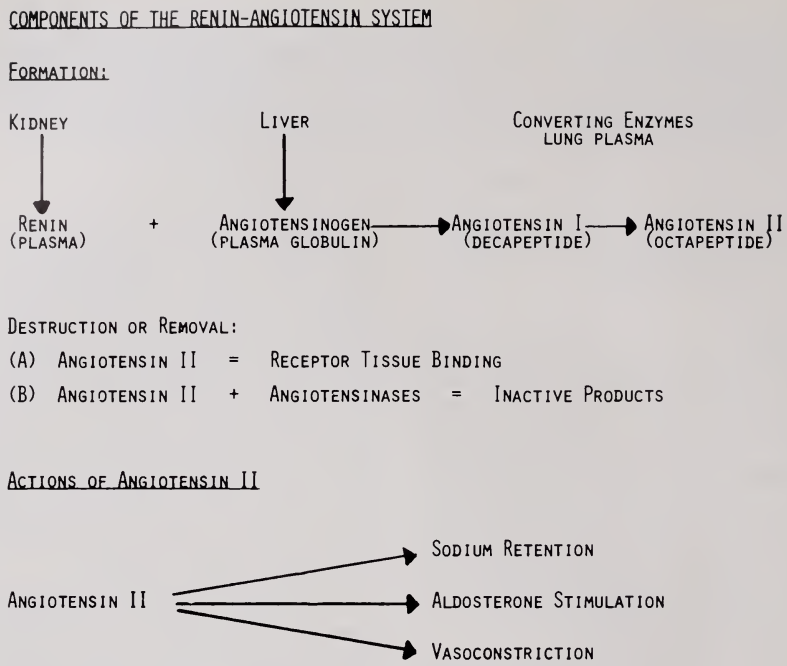

Fig. 1. Components of the renin-angiotensin system

patients and the basis for more rational and individualized treatment, and therefore more reasonable prognostication.

THE RENIN-ALDOSTERONE AXIS IN HYPERTENSION

The various pieces of the puzzle began to fall into place in 1955 following the discovery of the adrenal cortical hormone, aldosterone, and with the subsequent appreciation that it was responsible for the regulation of sodium balance in the body. Because of its intimate role in maintaining sodium homeostasis it was reasonable to assume that it might also figure in hypertension. Before this question could be examined it was necessary to develop a means of measuring this hormone accurately, since it is present in the blood in only nanogram amounts or 1/10,000th of the amount of cortisol. This difficulty was worked out with the aid of Drs. Stanley Ulick and Seymour Lieberman, when we developed a tritium-carbon double label method for measuring the aldosterone excreted into urine. Using this very precise technique, we found that urinary aldosterone excretion in normal subjects could range from 20 to 200 μg/day, and varied inversely with salt intake.

Turning next to a series of patients with a variety of hypertensive diseases, we discovered that those with benign hypertension had essentially normal aldosterone levels, those with primary aldosteronism (Conn's syndrome) had markedly elevated levels from 500 to 1500 μg/day, and patients with malignant hypertension had even more strikingly elevated levels of the hormone ranging upwards as high as 10,000 mgm/day.

Yet an excessive aldosterone secretion, apparently, is one of the few features uniting these two hypertensive conditions. As is known, for example, primary aldosteronism is usually a relatively benign condition and has a long evolu-

tion. It is cured by surgical removal of the offending adenoma in the adrenal cortex. Malignant hypertension, by contrast, is quite different both clinically and pathologically. It is marked by a necrotizing arteriolitis; victims do not have adrenal adenomas and total adrenalectomy is of no special benefit in lowering blood pressure.

Why then do patients with malignant hypertension secrete such staggering amounts of aldosterone? Logically, it would appear that the adrenals receive some extra-adrenal stimulus calling forth this augmented aldosterone production. Since the kidney itself is presumably the major source of pathologic change in this situation, it seemed reasonable that there might be some involvement of the renal pressor system, *i.e.*, renin and the powerful pressor substance, angiotensin, which it releases in the blood.

To test this possibility we infused angiotensin II into normal subjects. The result was a 50 to 250% rise in aldosterone production. We found, moreover, that no other pressor agent of the catecholamine series had this effect. This, then, proved a newly discovered hormonal system—the renin-angiotensin-aldosterone system—that provided an endocrinal interaction between the adrenals and kidneys, apparently unmodulated by the pituitary as is the case in other more classical endocrine mechanisms.

Reasoning further, we hypothesized that the basic factor in malignant hypertension is the excessive release of renin into the plasma. The renin then acts upon a plasma substrate formed in the liver to produce angiotensin which, in turn, not only raises the blood pressure but also signals the adrenal cortex to release additional aldosterone (Figure 1).

In the normal patient the aldosterone would induce relative salt retention by the kidney, leading to expansion of the blood volume and, accordingly, the initial signal for renin release would be nullified, that is, the feedback loop would be closed with the correction of sodium homeostasis.

In malignant hypertension, however, the feedback loop fails to close because the kidney has been damaged to the point that it responds inappropriately. Instead of ceasing to secrete excessive renin, it continues to put out more than is needed, resulting in a continuation of the excessive angiotensin release and this, in turn, augments and maintains the excessive aldosterone production. The outcome, inevitably, is still greater vascular damage as the ungoverned mechanism continues to overspeed, leading ultimately to necrotizing arteritis and death.

There are three main lines of evidence attesting to the validity of the hypothetical construct that the basic defect in malignant hypertension is an endocrinal feedback loop converted into a vicious cycle.

The first is the showing that injection of neither renin nor aldosterone alone has any serious effect upon an animal, while an injection of both substances is followed by vasculitis and death (in most animals and usually within 24 hours).

A second piece of evidence arguing for our hypothesis comes from studies in the Goldblatt dog which indicate that the animal with benign chronic hypertension has normal renin and aldosterone levels. But when the clamps are tightened to produce malignant hypertension (followed by vasculitis and death in most animals), both renin and aldosterone levels become very high.

But the most compelling arguments for this thesis come from clinical experience itself. It has been clearly shown that bilateral nephrectomy almost always converts the malignant hypertensive into a benign one and, at the same time, reverses the necrotizing

arteritis that characterizes the former. This clearly suggests that the excessive renin and aldosterone in malignant hypertension have some role in the production of the necrotizing arteritis.

The practical implications of the kinetics of the renin-angiotensin-aldosterone axis can be illustrated in numerous clinical situations. The patient who has demonstrable aldosteronism, or good evidence of it such as hypokalemia, for instance, and who is then put on a low salt diet and still proves to have very low renin in the face of very high aldosterone invariably proves to have adrenal hypertension—*i.e.*, the blood pressure elevation arises from autonomous adrenal cortical oversecretion.

If, on the other hand, our hypothetical patient proves to have high renin activity, it is a foregone conclusion that the primary factor is renal (rather than adrenal) and that the aldosterone excess is secondary to renal disease.

PSEUDOPRIMARY ALDOSTERONISM

But at times clinical findings are quite puzzling: they may be made to fit our theoretical etiologic constructs, but the outcome of established therapy is paradoxical. An illustration of this is a case which we diagnosed as adrenal cortical hypertension. The patient was a 36-year-old woman who presented with a seven or eight-year history of hypertension. Her picture was typical of the triad of Conn's syndrome: severe hypertension, aldosterone excess and low renin—all clearly suggesting an adrenal cortical adenoma. Balance studies done at various levels of sodium and potassium intake confirmed these findings.

At surgery the patient was found to have bilateral adrenal cortical hyperplasia rather than a discrete tumor and a total adrenalectomy was therefore done. Postsurgical results, however, were quite disheartening. The blood pressure was lowered not at all, despite the fact that the hypokalemia disappeared. The aldosterone level fell to zero and the renin value became normal.

Thus, it appears that adrenal hypertension involving aldosterone excess from bilateral adrenal hyperplasia (we call this pseudoprimary aldosteronism) is biologically distinct from the same pathologic condition arising from an adenoma. The latter, as has been noted, is cured by removal of the adenoma. But in the former, even when we correct the biochemical defect, we are unable to alter all of the pathologic process.

RENOVASCULAR HYPERTENSION

Goldblatt (or renal vascular) hypertension in man likewise presents a number of paradoxes. The typical patient has hypertension of recent onset which develops at an inappropriate age (under 20 or over 50); there may also be a history of trauma to the kidneys shortly before onset; polyuria, polydipsia and weight loss may be manifest, the malignant syndrome may appear, and there is a negative family history. An abdominal bruit may or may not be present, but its absence in this setting should not deter one from additional diagnostic procedures, such as angiography.

But, as with adrenal hypertension due to bilateral hyperplasia, we often seem able to wipe out the cause without effecting a cure. According to the cooperative study the national cure rate for renovascular hypertension, even with careful work-up, is apparently only about 50 to 60%.

Analysis of our series of 25 patients cured by either nephrectomy or arterial repair showed that those who had had a normal plasma renin had less than a 50% chance of cure, while those with renin

clearly above normal were all cured with renal surgery.

The reason for this phenomenon is unclear. But one factor perhaps not always fully appreciated is that a large percentage of these patients have occult disease in the contralateral, ostensibly uninvolved, kidney. We have found, for example, using renal vein renin determinations, that the uninvolved "better" kidney in these patients may often be secreting significant amounts of renin.

Clearly implicit in these findings may be the need for some modification of the criteria used for selecting renal vascular patients for surgery. The two major factors apparently should be: 1., The demonstration of a high peripheral plasma renin level in relation to sodium excretion. This is prima facie evidence of hypersecretion. 2., The concomitant demonstration of "winking," *i.e.*, one kidney is supplying the entire renin output while the other supplies none. That is, there is complete contralateral renin suppression. A third supportive criterion is the demonstration of a reduced blood flow in the suspect kidney. This can be determined from equations we have developed using the peripheral and renal renin values.

ORAL CONTRACEPTIVE HYPERTENSION

Another point concerning the renin-angiotensin-aldosterone mechanism that may be worth emphasizing is the fact that it necessarily implies the existence of a multiplicity of points at which a rate-limiting factor may be added or subtracted. This is seen in the patient with liver disease who is unable to make the necessary renin substrate and consequently has a low circulating angiotensin level, a low aldosterone and a low blood pressure.

A practical example of the converse, *i.e.*, hypertension associated with an excess of renin substrate, is that of a 33-year old woman who came to us a few years ago with severe hypertension. Her work-up and angiogram were unproductive. But at some point she mentioned that she had been taking an oral contraceptive (Enovid-E) for five years. With no real knowledge of what effect it might have at that time, we advised her to discontinue it.

She returned some three months later at which time she was normotensive but also very anxious to use the pill once more. This time we put her on another preparation (Ortho-Novum) and took the precaution of doing careful before and after studies. These showed clearly that the oral contraceptive was associated with an enormous rise in renin substrate and a consequent rise in plasma renin, a rise in aldosterone secretion and hypertension (200/130 in this case).

This striking phenomenon, fortunately, is quite rare and is reversible in most cases. But several hundred such cases have now been reported. This illustrates an instance in which too high a level of renin substrate can disturb the normal hormonal feed-back loop regulating blood pressure and cause hypertension. Recent studies, of course, have confirmed that oral contraceptives do in fact act to raise the blood pressure somewhat in many users, but, on the average, the increase is usually so slight that it goes unnoticed in most cases.

THE ESSENTIAL HYPERTENSION PROBLEM

Having come to the point of demonstrating the hormonal mechanisms involved in the most severe forms of hypertension, it was natural to suspect that more subtle abnormalities in this hormonal circuit might be operative in these more common and less severe

forms of the disease. Using further improved aldosterone and renin assay techniques, we evaluated both against an index of salt balance in a group of 52 normal volunteers and in a group of 219 patients with essential hypertension. This, it will be appreciated, was a logical procedure since dietary salt is known to play a key role in hypertension. Furthermore, whether a given level of renin or aldosterone should be considered abnormal actually depends upon the level of salt intake, or more precisely, the sodium balance at that point.

Accordingly, we first drew up a set of nomograms showing the values for both renin and aldosterone for differing levels of salt intake. When we compared the values of the essential hypertensives with those of the normal patients, it was apparent that those of the former fell into three renin categories—high, normal and low. Some 18%, we found, had high renin levels, 26% had a reduced level, while 54% fell into the normal range.

It was equally apparent that the essential hypertensives fell into three similar patterns when aldosterone excretion was considered: Some 60% had values which appropriately followed the renin levels with the exceptions defining categories of abnormally high aldosterone.

When we further subdivided these patients on the basis of both renin and aldosterone levels we found that they fitted a total of eight of nine theoretical combinations. This would clearly suggest that there could, in fact, be as many as eight different biochemical subtypes of essential hypertension.

By far the most common hormonal pattern was normal renin and normal a'dosterone, found in from 36 to 54% of our patients (depending on the strictness of the criteria used). Only a very small fraction of these patients with normal renin showed any deflections upward or downward in aldosterone secretion. In the low renin hypertensives, also, nearly all showed normal aldosterone levels, but 8% had a reduced excretion rate.

On the other hand, absolutely increased aldosterone production in the face of subnormal plasma renin activity was infrequently seen. This pattern is suggestive of primary aldosteronism. Moreover, the few patients in this subgroup showed only a modestly elevated aldosterone level and no evidence of hypokalemia. No exploration was done in these patients as experience has shown that they do not have typical adenomas and their hypertension is not affected by either partial or total adrenalectomy.

Some 14 to 21% of the essential hypertensives may exhibit abnormally elevated plasma renin levels. In all of these instances the aldosterone excretion rate was either normal or somewhat elevated. None of the patients showed a reduced aldosterone excretion in the presence of high plasma renin.

LOW RENIN ESSENTIAL HYPERTENSION

There is good circumstantial evidence to suggest that low renin essential hypertensives, who may comprise some 30% of the total essential hypertensives, have a chronic expansion of plasma and extracellular fluid volumes. These patients, accordingly, usually respond to diuretics. They have, moreover, lower blood urea levels than do essential hypertensives with normal renin. These findings, when considered in conjunction with the fact that plasma renin activity is normally inversely related to salt and water balance, suggest that the low renin level in most of these patients is indicative of a volume-expanded state (except in instances of a defect in renal secretion).

A number of mechanisms are known to be capable of producing an expanded fluid volume hypertension. In animals,

for example, chronic ingestion of a high sodium diet has this effect but the amounts of salt required greatly exceed those used by man on a weight adjusted basis. At any rate, hypertension produced by this mechanism would be expected to be accompanied by renin and aldosterone levels below normal. In practice, as noted, this pattern is seen in about one third of patients with low-renin essential hypertension.

A second possible mechanism for expanded fluid volume hypertension might be an impaired renal sodium excretory potential—the kidney is unable to handle the amount of salt ingested. In this case, again, one would expect both aldosterone and renin to be low. But the actual derangement, in view of the renal disturbance, may simply be an abnormal or inappropriate renin secretion.

Yet another possible mechanism that could account for volume-based hypertension is an inability of the kidneys to secrete potassium. This would entail an increase in plasma potassium and, hence, an increase in aldosterone secretion which, in turn, would mean volume expansion, increased vascular pressor sensitivity and a suppression of plasma renin activity. And in the compensated state, potassium balance would be normalized and the hypertension would be maintained by aldosterone-induced sodium retention, with consequent amplified vascular sensitivity to angiotensin. Bolstering this theoretical construct is the fact that potassium gain is known to stimulate aldosterone while suppressing renin. It should also be noted that patients with low renin hypertension often have an inappropriately high aldosterone secretion for their renin level and that these patients are usually normokalemic.

The fourth possible mechanism for volume-sustained essential hypertension is a primary adrenal aberration of some type entailing increased secretion of aldosterone or of some as yet unidentified mineralocorticoid. This would lead to volume expansion and to suppressed renin levels, but in contrast to the first three conditions we have mentioned, potassium wastage and hypokalemia should be concomitants.

HIGH RENIN ESSENTIAL HYPERTENSION

What of the vasoconstrictor, or high renin, forms of hypertension? As noted, these comprise about 16% of all essential hypertensives. The fact that they respond uniquely to propranolol which reduces their renin secretion and blood pressure suggests that the principal factor in their disease is the elevated renin level itself. However, this response to a beta adrenergic blocking agent could also suggest that there may be some neural component in the increased renin activity.

Clinically, the high-renin essential hypertensive presents with increased renin and aldosterone, as well as a tendency to hypokalemia and, at times, subtle indications of renal damage. This condition, apparently, may be a precursor of malignant hypertension. The high aldosterone seen in these patients might be expected to result in sodium retention and volume expansion, but this effect is mitigated by rather pronounced vasoconstriction which induces natriuresis and contracts the plasma volume. Accordingly, diuretics are not always appropriate for these patients.

NORMAL RENIN ESSENTIAL HYPERTENSION

Yet a third aberration, in terms of pathophysiologic processes immediately involved, is, as we have noted, an abnormal summation of both vasoconstriction and fluid volume. This, it happens, may be by far the most

common form, for about 57% of all essential hypertensives have normal renin levels. The majority of these patients, moreover, also have normal aldosterone levels and a normal aldosterone-renin ratio for any given level of sodium balance. On the basis of their hormonal profile, this group seems to be much more uniform than the low-renin hypertensives and the consistency of the pattern seen seems to suggest a single causal factor for hypertension in these patients. Once all of the mechanisms of essential hypertension have been fully uncovered, in fact, it may well be that this term will survive only for this group—those patients with no apparent hormonal basis for their hypertension.

But as matters now stand, it would appear that their ostensibly normal renin levels are in fact too high since, other things being equal, arterial hypertension itself should act to suppress renin. Moreover, the arterial hypertension should lead to natriuresis, entailing a fall in blood pressure. In this instance, then, the persisting hypertension suggests an inability to excrete salt. Thus, one would suspect that these patients with an apparently normal renin level could also have a renal basis for their hypertension.

If the process begins as a primary renal disturbance entailing a subtle increase in renin secretion, followed by angiotensin formation and then increased aldosterone secretion, our experiments suggest that at some point or other the renin may no longer be elevated because it is suppressed by the aldosterone-induced sodium retention. In this situation ostensibly normal amounts of angiotensin might continue to result in hypertension due to increased vascular reactivity to it, even when the amounts of angiotensin might be too low to stimulate aldosterone secretion. A series of events similar to that seen in infusion studies of normal subjects might occur. An initially high angiotensin level would stimulate aldosterone and sodium retention and the angiotensin and sodium together would raise arterial pressure. The sodium retention and the increased blood pressure together, in turn, would tend to suppress renin secretion. And, with time, the level of angiotensin required to maintain the hypertension might fall to normal or near normal. Thus, a point might be reached at which angiotensin levels had fallen to normal or near normal, yet the hypertension might persist. In this situation aldosterone would presumably be normal also. This sequence of events could accordingly result in chronic hypertension in the absence of hormonal disturbance, save for a subtle increase in body sodium.

This would imply that hypertension arising solely or mainly from an abnormal summation of vasoconstrictor and volume factors would become manifest as a subtle retention of sodium. In some of these normal renin patients anti-renin or diuretic therapy alone could be effective while others might require combined pharmacotherapy.

In this situation, to return to our discussion of the renin-angiotensin-aldosterone axis, the initial defect leading to hypertension is apparently masked by a series of readjustments in the feed-back mechanisms and by changes in the autoregulatory activity of the kidney. Thus, once established, this type of vasoconstriction-cum-volume expansion hypertension would manifest normal or only slightly elevated renin and aldosterone levels. These values, nevertheless, would be inappropriately high for the sodium balance, even though nominally "normal."

THEORETICAL AND CLINICAL IMPLICATIONS

These distinctions in the hormonal make-up of essential hypertension are by

no means academic. A careful study of the 219 essential hypertensives that we had studied, done by Dr. Hans Brunner, showed that the different hormonal profiles had definite clinical significance. He found, for example, that those with low plasma renin activity seemed to be protected against heart attacks and strokes, while those with normal or high renin activity were not, even though both groups had similar degrees of hypertension, equal cardiac enlargement but with a higher mean age for the protected group. There was not a single stroke or heart attack among the low renin essential hypertensives, but there was a combined incidence of 11 and 14% in the normal-renin and high-renin patients.

These results may explain the clinical paradox presented by those patients with extremely high blood pressure who nevertheless live to a very old age and often die of causes unrelated to hypertension, in spite of the fact that their disease is longstanding and may, in fact, have gone untreated. The benign nature of low-renin hypertension, it should be noted, resembles the usually relatively benign nature of primary aldosteronism in which renin is comparably depressed. On the other hand, in essential hypertension marked by normal or elevated renin levels, the primary factor may be vascular insult. This, it should be borne in mind, is a principal feature in malignant hypertension. But in the patient with essential hypertension, the combination of normal renin or high renin, with normal aldosterone, but with some degree of vascular insult, may somehow increase the likelihood of stroke or heart attack or more serious vascular damage when taken together. Various animal models support these suggestions.

The full implications of these findings remain to be fathomed, but some can already be discerned. For one thing, they suggest that propranolol may be quite useful in high and some normal hypertensions since this drug (beta-adrenergic blocker) virtually abolishes renin secretion and reverses the hypertension. And, in contrast, they suggest that propranolol would be of no benefit in low-renin types of hypertension, while diuretic therapy should be helpful. Both of these points have been borne out so far in our clinical experience.

Thus, it appears that the profiling of the hypertensive patient on the basis of hormonal components involved offers a basis for a better understanding by exposing renin and volume components of individual cases and should provide a basis for predicting simpler and more rational long-term treatment. It also has, as indicated earlier, considerable prognostic value, for the clinician can not only decide which therapy is more likely to succeed but also just how urgently treatment of any sort may be needed. At the moment a single renin measurement with the urinary sodium (the renin-sodium index) suffices both to classify the patient and to plan when and how to treat. Eventually, of course, it may also be possible with this information in hand to categorize the hypertensive simply on an empiric basis according to the response to a particular drug, such as propranolol.

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Memoir of Bernard C. Gettes 1912–73

By SOLOMON S. BRAV, M.D.

Bernard C. Gettes, M.D., died suddenly of a massive coronary infarct on May 9, 1973, in the doctors' dressing room of the Wills Eye Hospital. He was 60 years of age.

Dr. Gettes was graduated from Temple University, attaining his B.S. in 1932 and his M.D. in 1936 from Temple University Medical School. He served his internship at Saint Joseph's Hospital in Philadelphia in 1936—37. Following postgraduate ophthalmic training at the Massachusetts Eye and Ear Infirmary, he then served his ophthalmic residency at the Boston City Hospital in 1938—40. He served with distinction during World War II, attaining the rank of Lieutenant in the United States Navy, and returned to civilian life in 1946, at which time he entered the private practice of medicine (ophthalmology).

Dr. Gettes was Chief Ophthalmologist at various times at Saint Joseph's Hospital, Stetson Hospital and Philadelphia General Hospital and held that position throughout his lifetime or the lifetime of the institution or until he resigned because of pressure of duties at the Wills Eye Hospital.

Dr. Gettes' major hospital connection, and the institution to which he dedicated his more than thirty years of professional existence, was the Wills Eye Hospital of Philadelphia. Upon his return from service in the Navy, he served with distinction as Chief of Refraction from 1946 through 1955. He rose through the ranks, starting in 1940 as a Clinical Assistant, until he became Attending Surgeon in 1967 and President of the Medical Staff in 1971.

Among his many contributions to the advancement of education of training ophthalmologists was his appointment to the faculty of the Lancaster Course in Ophthalmology, teaching refraction there for many years, and also as a member of the faculty of the Home Study Courses of the American Academy of Ophthalmology & Otolaryngology; as an instructor in courses he presented at the organization's annual meetings. He was also Assistant Professor of Ophthalmology for many years at the Graduate School of Medicine of the University of Pennsylvania in Philadelphia. He was on the Medical Advisory Board of the Center for the Blind.

Dr. Gettes maintained multiple memberships in organizations, including the A. M. A., the AAOO, the Philadelphia County Medical Society, The College of Physicians of Philadelphia (serving a number of terms as Clerk of the Section on Ophthalmology) and many other organizations devoted to the study of disease of the eye. He was a Fellow of the American College of Surgeons.

Dr. Gettes was nationally recognized for his textbook on *Refraction* which enjoyed two major editions (1957 and 1965) and for the volume on Refraction which he edited for The International Ophthalmologic Clinics in 1965. He performed the major investigative work on both cyclopentolate (Cyclogy) and tropicamide (Mydriacyl) and was a contributor to the major ocular journals of this country of presentations too numerous to detail. He was likewise well known for his work in the various drugs utilized in refraction and for his investigations in the field of Low Vision Aids.

Dr. Gettes was deeply devoted to

sectarian and non-sectarian causes in the community and was active in multiple charitable causes.

He is survived by his wife of 38 years, Mrs. Rea (Rosoff) Gettes, his son, Andrew Gettes, his daughter, Nancy J. Gettes, M.D., and two brothers, Charles Gettes, M.D., of Boston, Massachusetts, and Max Gettes of Philadelphia.

He is mourned by his family, the entire staff of the Wills Eye Hospital who knew him as a dedicated and loyal staff member, and by a host of professional and nonprofessional friends.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of Leon Kacher
1913–73

By CLARENCE C. BRISCOE, M.D.

Leon Kacher died of a myocardial infarction on January 18, 1973. Born January 14, 1913, in Philadelphia, the son of Abraham and Elsie Packman Kacher, he received bachelor and medical degrees from the University of Pennsylvania in 1932 and 1936 respectively. He served his internship at Mt. Sinai Hospital.

His staff appointments were at St. Luke's and Childrens Medical Center, Einstein Medical Center Southern Division, the Pennsylvania Hospital and Oxford Hospital. At one time on the faculty at Hahnemann Medical College, after 1957 he was affiliated with the School of Medicine and the Graduate School of Medicine of the University of Pennsylvania.

A Diplomate of the American Board of Obstetrics and Gynecology, Dr. Kacher also was a Fellow of the American College of Obstetrics and Gynecology, a Fellow of the American and International Colleges of Surgery and the Pan-American Cancer Cytology Society, as well as the American Association for the Advancement of Science and the Obstetrical Society of Philadelphia. He was a member of County and State Medical Societies and the American Medical Association.

Dr. Kacher contributed to his specialty literature and was advisor for the Philadelphia Selective Service System for which he received a Presidential Citation.

He belonged to the Faculty Club of the University of Pennsylvania and the Franklin Mercantile Chess Club and was a Free and Accepted Mason. His hobbies were chess and music.

Dr. Kacher is survived by his wife, the former Hester Ziserman, and by his daughter Joy-Alyne.

A man of quiet dignity, Leon Kacher loved his professional work and his patients; he was beloved by them in turn. He was a good doctor and a gentleman.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of James J. Ryan 1915–73

By DONALD C. GEIST, M.D.

James J. Ryan was born at Baltimore, Maryland, on December 30, 1915 to William A. Ryan and Victoria Donnet Ryan. When Dr. Ryan was not quite five years of age, the family came to live at St. Davids, Pennsylvania. His father established the Ryan Construction Company. Jim had seven brothers and two sisters. They leaned strongly to professional vocations: one brother became a Jesuit priest, two were attorneys, one a teacher, and his sister, Eleanor, a graduate in nursing education, Jim being the only physician.

His preliminary education was obtained in the parochial schools at Wayne, Pennsylvania, later at Waldron Academy in Merion, and his high school days were spent at St. Joseph's Preparatory School. Jim received his premedical training at St. Joseph's College where he was granted a B.A. He then entered Jefferson Medical College, attaining his M.D. in 1942. During the later years of medical school, Dr. Ryan first considered psychiatry as a permanent career. These were days when hospital staffs were beginning to be depleted as their members left for World War II, and during his senior year he assisted by working in the neurologic and psychiatric clinics of Jefferson Hospital. Several summers were occupied by serving as an attendant at Fairmount Farms, a private psychiatric institution.

An internship followed at Misericordia Hospital in Philadelphia, terminating in 1943. Shortly after completing his internship, Dr. Ryan entered the medical corps of the United States Army with the rank of Captain. His duties began at Halleran General Hospital on Staten Island, New York, and during this period he completed special courses in psychiatry and traumatic surgery. He was then sent overseas for duty with the 297th General Hospital (Cook County General Unit) in England. After about a year he was assigned to the 201st General Hospital in France and Germany, ending his military service in 1947. The war changed his opinion about pursuing psychiatry and he decided to undertake training in general surgery. After finishing the Graduate Course in Surgery at the Graduate School of the University of Pennsylvania, Jim pursued a two year residency at Jewish Hospital (now the Northern Division of the Albert Einstein Medical Center). This was completed in 1949 and he then served a year's residency at the Veterans Hospital at Oteen, North Carolina, an experience which led to his lifelong interest in thoracic surgery.

Upon completion of his graduate education, Dr. Ryan returned to Philadelphia where he became an associate surgeon on the author's service at Misericordia Hospital and in 1960 formed a partnership for the private practice of surgery at Misericordia. He also joined the staffs of St. Joseph's Hospital and the Northern Division of the Philadelphia General Hospital, remaining there until its closure. It was at the last named institution that he did most of his thoracic surgery. In 1971 Dr. Ryan decided to give up practice in Philadelphia and joined a newly forming group in Hill City, Kansas, with hospital affiliations at the Graham County Hospital. Everything pointed to future success

until his untimely death ended his career. Dr. Ryan's major interest was the practice of clinical surgery. He was a competent general and thoracic surgeon, devoted to the care of his patients and always concerned with their health and welfare. He was a member of the Philadelphia County Medical Society, Pennsylvania State Medical Society and the American Medical Association. He was certified by the American Board of Surgery. He was a Fellow of the American College of Surgeons and became a Fellow of The College of Physicians of Philadelphia in 1963. In 1968 and 1969, he was Chairman of the West Branch of the Philadelphia County Medical Society and for a number of years was an active member of its insurance committee.

In 1942 Dr. Ryan married Jean Becht, and they took pride in their two daughters, Karen and Barbara. His wife is an accomplished artist with considerable talent in oils and water colors, a source of pride to Jim. Jim Ryan was a likeable, pleasant person, quite sensitive and very private in regard to his personal life. He had great integrity, a fine sense of loyalty, compassion and sympathy for his patients and friends and much devotion for his family. His death came suddenly on March 23, 1973, at Hill City, Kansas, bringing great sorrow to Jean, Karen and Barbara and his much loved brothers and sisters. It came suddenly as he often hoped it would. He disliked show, was not deluded by any desire for fame, and was quite content with the life he was given, sharing it freely with his family, friends and patients.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of Frederick R. Robbins 1897–1973

By WILLIAM C. STAINBACK, M.D.

It was with deep regret that the community and the medical staff at The Bryn Mawr Hospital learned of the death of Dr. Frederick R. Robbins on January 12, 1973.

Born in Buffalo Cove, North Carolina, on October 17, 1897, Dr. Robbins attended the University of North Carolina, from which he was graduated with a Bachelor of Science degree in 1919. Four years later he received his medical degree from the University of Pennsylvania. Following an internship at Pennsylvania Hospital, he served as a resident in surgery from 1923 to 1926 and was ultimately named Chief Resident Physician at this hospital.

He was appointed to the attending staff of The Bryn Mawr Hospital in 1926 as Assistant Surgeon and in 1927 he was appointed Assistant Surgeon to the Out-Patient Clinic of the Pennsylvania Hospital. In 1930 he became Assistant Surgeon to the Pennsylvania Hospital and in 1946 was promoted to Surgeon to the Hospital. Dr. Robbins was appointed Assistant Attending Surgeon at The Bryn Mawr Hospital in 1937.

On January 5, 1942, Dr. Robbins, together with other members of The Bryn Mawr Hospital Unit, left for active duty in the Medical Corps of the Navy, with the rank of Captain. He was decorated with the Navy Commendation Ribbon and remained a member of the Naval Reserve Medical Corps after the close of World War II. Dr. Robbins' service occurred at a time of life when it involved an unusual measure of personal and professional sacrifice, but he always looked back on it as a happy and rewarding experience.

He returned to the surgical staff of both The Bryn Mawr and Pennsylvania Hospital in 1946 and was chief of a surgical service at the Pennsylvania Hospital. The following year he was promoted to the rank of Attending Surgeon at The Bryn Mawr Hospital and in 1952 he was appointed Surgeon-in-Chief (the title was later changed to Director of the Department of Surgery), succeeding Dr. John B. Flick on his retirement from that position. He held this position until he reached the age of retirement from administrative duties in 1962. At that time, he was appointed Consulting Surgeon in the Service of General Surgery, a position which he held at the time of his death. He also served as consultant in surgery at the Valley Forge Army Hospital. He was Assistant Professor of Clinical Surgery at the School of Medicine of the University of Pennsylvania and Associate Professor of Surgery at the Graduate School of Medicine.

Doctor Robbins was a Diplomate of the American Board of Surgery, a fellow of the American College of Surgery and a member of the Philadelphia Academy of Surgery. He was also a member of the American Medical Association and the Philadelphia County Medical Society and was the author of numerous medical publications. He was an excellent clinician and was well known for his bedside teaching, devoting himself to the training of a long succession of interns and surgical residents. It was during his regime as Director of the Department of Surgery that the four-year surgical residency program at The Bryn Mawr Hospital was established and achieved formal approval. He served on many

important Staff Committees and was a member of the Executive Committee during his incumbency as director of the Department of Surgery.

His calm demeanor and quiet kindliness won the confidence of his patients and fellow physicians. His surgical skill, great gift as a diagnostician and superior clinical judgement together with his unvarying loyalty brought him the esteem of his colleagues and the devotion of the nursing staff at the hospital.

The Bryn Mawr Hospital family and community were deeply shocked by the accident on May 4, 1963, which crippled his right hand and which forced Dr. Robbins to withdraw from active practice.

Dr. Robbins was elected to The College of Physicians of Philadelphia in 1932. He was proud to be a member of The College of Physicians and served the College with distinction. Let it be recorded that he devoted his life to the practice of the art and science of surgery and served his patients, his community, his hospital, his profession, and this College well.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of Samuel Emlen Stokes 1894–1972

By JONATHAN E. RHOADS, M.D.

Dr. S. Emlen Stokes became a Fellow of The College of Physicians of Philadelphia on April 7, 1943, and continued his membership until his death on October 9, 1972. When he retired from active practice in Moorestown, New Jersey, in 1968, it was the first time that this community had been without the services of a Dr. Stokes in over 200 years. Dr. Stokes' career was a fascinating one from many points of view. He entered politics and served three terms in the State legislature in New Jersey. He was extremely active in public service projects, both in his home state of New Jersey where he was on the Board of the South Jersey Medical Research Institute, and in Pennsylvania where he was a member of the Board of Managers of Haverford College from 1938 to 1963, serving as chairman of the Board for a period of eighteen years from 1945 to 1963.

Dr. Stokes was born in Moorestown, the son of Dr. Joseph Stokes and of Mary Emlen Stokes, originally of Germantown, Pennsylvania. He was educated at Moorestown Friends School, Haverford College, and the University of Pennsylvania School of Medicine, graduating from the latter in 1918. After doing family practice for a number of years, he specialized in pediatrics and for 27 years, from 1926 to 1953, he served as Chief of Pediatrics in the Burlington County Hospital in Mt. Holly, New Jersey, and at the Cooper Hospital in Camden from 1922 to 1933.

Outside of his long and earnest commitment to medicine, his great love was for Haverford College. He attended the College from 1910 to 1914. He played on the varsity soccer team for four years and in his senior year was selected a member of the All-American team. He was a member of the varsity cricket team in his junior and senior years, serving as manager in his senior year and playing on teams that visited Canada and England. He was also a competent gymnast. After college, he played tennis well and golf very well. Becoming a member of the Board of Managers of the College in 1930, he was early elected as chairman, succeeding the late Morris E. Leeds.

During his period on the Board, Haverford had five presidents: William Comfort, Felix Morley, Gilbert White, Hugh Borton, and John Coleman. Dr. Stokes lent strong support to each of these administrations and presided over three fund-raising drives, one beginning in the late forties, one in the mid-fifties and another in the early sixties. During his long tenure, he saw the college grow 60% in size and add numerous new buildings to its plant, including five new dormitories, new laboratories for physics, mathematics, chemistry and psychology, and a field house. The building accommodating the physical sciences was named Stokes Hall in his honor in 1964. The influence of his guidance of college policy had a most important influence on the College. He continued to serve on the Finance and Investment Committee and the Committee on Honorary Degrees for many years after he asked to be relieved as chairman of Board. He was greatly beloved by his fellow members of the Board of Managers and by the many other people on campus who came to know him.

Other civic activities included member-

ship on the Board of Control of the Department of Institutions and Agencies of the state of New Jersey and service for 43 years on the Committee in charge of Moorestown Friends School, where again he was chairman during a long period.

In addition to his very active practice in Moorestown, he did much to strengthen the Burlington County Hospital. He served the hospital, not only as chief of pediatrics for 32 years, but in helping to attract able members of the staff and helping to support the hospital in its efforts to raise money in the community. As a member of the Board of Directors of the Institute for Medical Research, he supported its director, Dr. Lewis Coriell, in the creation of what has come to be one of the outstanding cancer research institutes in America.

In 1920 he married Lydia Pratt Babbott who survives him. Among her many interests has been the World Council of Churches to which she has been a delegate for many years. The Stokeses had four children: Samuel Emlen, Jr., Sally B. (Mrs. James Venerable), Lydia (Mrs. Robin Willits), and Ann R.

Dr. Stokes' personal impact is difficult to describe. He was always the reasoned optimist; thus, he was always constructive in a group. His optimism was balanced by common sense and a surprisingly accurate knowledge of hard facts. He was handsome, always well-groomed, and carried himself like an athlete, clear into his advanced years. His feeling for people was deep and instinctive. His sincere devotion to others was manifest in all his many relationships.

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The Historical Collections of the Library of The College of Physicians of Philadelphia: A Survey of Their Extent in 1973 and a Chronicle of the Major Acquisitions

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The Historical Collections of this Library may be summarized statistically as comprising over 60,000 volumes—books and bound journals—published before 1900, of which nearly 10,000, by a recent count, were printed before 1801. Incunabula, or works printed before 1501, number 423. Pre-1800 theses may be conservatively estimated at 1,500 and pamphlets from the same period at 3,000; nineteenth-century theses and pamphlets cannot be estimated with any pretense at accuracy at all, except to say that their number must exceed 50,000. "Major" manuscripts, meaning those of book- or article-length, so designated for convenience, can be counted at nearly 1,000; "minor" manuscripts—letters, autographs, certificates and so on—include over 10,000 pieces. Pictorial materials of various kinds number at least 9,000 individual items, while the Portrait Catalogue lists more than 80,000 names of physicians and other medical personages pictured in books and journals.

Accounts of the Library, emphasizing its antiquities, have appeared in print on several occasions. Ruschenberger's history in 1887 (1) is the most extensive, and constitutes the principal authority for most of the others, including this one; Alfred Stillé's account, also prepared for the College's centennial celebration, contains some lively personal reminiscences (2); Richard J. Dunglison wrote a chapter headed "The Public Medical Libraries of Philadelphia" for the *Standard History of the Medical Profession in Philadelphia*, edited by F. P. Henry, in 1897 (3), which includes some matters of interest overlooked by Ruschenberger; and Charles Perry Fisher produced a highly factual account in 1906 (4). In 1909, J. Norman Henry prepared a chapter on the College for *Founders' Week Memorial Volume* (5); de Schweinitz and McDaniel carried the story forward to 1934 (6); and Riesman summarized these accounts in 1937, for the 150th anniversary of the College (7).

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The object of the present paper—admittedly somewhat rash—is to estimate the present extent of the historical collections in more or less quantitative terms and to sketch the circumstances of the larger gifts and purchases to the present time.

Undoubtedly the prime interest of the collection, to the scholar and researcher, lies in its manuscripts and letters. These include about 140 sets of notes taken by medical students of the 18th and 19th centuries, from the lectures of their professors—particularly the early faculty of the University of Pennsylvania: Morgan, Shippen, Kuhn, Rush, Wistar, and so on—and, in turn, the notes of some of these early Philadelphians on the lectures of their Edinburgh professors (8).

Society records and archives constitute a major element of the manuscript collection, with the College's own archives naturally taking the principal place. One of the most fascinating of the early societies was Kappa Lambda, a secret medical organization of national extent, dedicated to the establishment of professional standards of practice. When it was dissolved in 1836, its officers deposited with the Library a large metal deed-box, appropriately equipped with lock and key (9). As might be expected, many Philadelphia societies, both early and late, have deposited their records for safekeeping: the Northern Medical Association, the West Philadelphia Medical Society, the Pathological Society of Philadelphia, the Association of the Out-door Physicians of the Guardians of the Poor of the City of Philadelphia, and the Medico-Chirurgical College, forerunner of the school of the same name, whose minutes were deposited in 1970, by a great-grand-niece of the founder, James Bryan.

A dozen Renaissance manuscripts have been contributed to the Library, of which eight are described in De Ricci's *Census of Medieval and Renaissance Manuscripts in the United States and Canada*, published in 1937. Of these, certainly the most famous is Sir William Osler's bequest, a transcript, beautifully illuminated, on vellum, dated 1348, of Bernard of Gordon's *Lilium medicinae* (10). We have recently had this expertly repaired and rebound, preserving the fifteenth-century leather sides.

The Library holds substantial collections of the papers, medical or personal, of many well-known physicians: Benjamin Rush, Franklin Bache, John Peter Mettauer, George Bacon Wood and Horatio C Wood, S. Weir Mitchell, Joseph Leidy, the Hodges—Hugh Lenox, Sr., and Jr.—W. W. Keen, the Norrises—George Washington, William F., and George William—the Ashhursts—John, and A. P. C.—and Edward Bell Krumbhaar, to name only a few almost at random. Ledgers and account books of Philadelphia physicians may be found to illustrate comparisons of late eighteenth- and nineteenth-century modes of practice: for example, the Bonds, Benjamin Say, John Syng Dorsey, William R. Cruice, and Arthur Blayney, whose ledger for the years 1802-14 was presented in 1973. Some time ago, the Free Library deposited 14 enormous scrapbooks, constituting the prescription-records of F. Brown, a Philadelphia drug firm in operation between 1860 and 1890. Several handwritten prescription-books and medical commonplace books are to be found here, which contain professional formulae and household cures and recipes as well, from the seventeenth to the twentieth century.

Perhaps the most often called-for of the miscellaneous manuscript collections are the dozen scrapbooks of Joseph Carson (1808-1876), which contain mementoes—letters or portraits or newspaper clippings—of hundreds of important American and British physicians.

Among the scrapbooks, however, the aristocrat is certainly the four massive volumes purchased by S. Weir Mitchell (and resplendently bound by him in red morocco) from the estate of William Kent Gilbert, in which may be found holograph letters of Jefferson, Audubon, Bartram, Hosack, Priestley, Shippen, Waterhouse and others. The College's own Autograph Collection now measures about 20 linear feet of miscellaneous letters and such, both early and recent. If one counts in the nearly 3,000 letters in the Leidy correspondence alone, our estimate of 10,000 individual letters is certainly low, perhaps absurdly so. Efforts are being made to list, or "calendar," the collections of physicians' papers; and, a catalogue of the "major" manuscripts is currently in preparation. Hopefully, within the next two or three years, these unique materials can be made much more accessible.

Printed books and journals, of course, constitute the vast bulk of the collection. The accession record of bound volumes, both old and new, stood at 266,000, as of June 1, 1973. What proportion of these were printed prior to 1900 no one can say with assurance, because the nineteenth-century books are not physically segregated from those of the twentieth century. (We have begun to segregate the nineteenth-century journals, but are not yet in a position to make an estimate.) The annual report of the Library for 1899 showed 37,000 unbound pamphlets, reports and transactions, and 57,201 bound volumes. Subsequent acquisitions of early materials, as will appear below, bring the total to over 60,000 bound volumes.

How was this very considerable collection accumulated?

The first, and founding, gift of books was made by John Morgan in December, 1788, with a further donation in January, 1789, and established, at the very beginning of the Library's existence, its dual emphasis on historical and contemporary medicine. As identified by W. B. McDaniel, 2d, in 1961 (11), Morgan's gifts included a sixteenth-century work by Alexander Benedictus, seventeenth-century editions of Aristotle and Hippocrates and Galen, and the works of Harvey, in the 1766 edition; among the more or less current eighteenth-century works, were the famous presentation copy of Morgagni's *De sedibus*, and, of course, Morgan's own writings.

The College appropriated 50 pounds for the purchase of books in November of 1789, and made further appropriations occasionally thereafter; gifts of money and books were made by William Shippen, Jr., John Morris, John Jones, Benjamin Rush and others; nevertheless, by 1818, when the first manuscript catalogue of the Library was compiled, it listed only 233 volumes.

"Forty-one years ago," said Alfred Stillé in 1887, "on one side of the President's chair there stood a book-case of moderate size. It was painted black, I think, and through its glazed doors could be dimly seen a few hundred volumes varying in size from folios and quartos to humbler types, and all by their musty and dingy bindings proclaiming their long disuse. . . . The ancient receptacle I have mentioned irresistibly suggested the chamber of an Egyptian tomb. . . . If the doors of it were ever opened, it must have exhaled a sepulchral odor." In May, 1844, the books of John Conrad Otto were purchased for $200, but "their number and quality are not stated in the records," continued Stillé (12); they were lodged "in a room over Dr. Hodge's office" at 9th and Walnut Streets (13). In 1855, over a hundred volumes were given by Mrs. Moreton Stillé as a memorial to her late husband. By this time the Library, now "disentombed" at

the Picture House of the Pennsylvania Hospital, the College's fourth rented home, numbered about 1,700 volumes. The Library Committee complained constantly that the books were seldom used and threatened by decay, but they also declined to open the reading room more than twice a month.

The first of the large private libraries came in 1856, with Thomas F. Betton's donation of 1,265 volumes, many "rare and valuable," from his own collection and that of his father, Samuel Betton of Germantown. Among seventeenth- and eighteenth-century editions of such medical writers as Amatus Lusitanus, Bartholinus, Boerhaave, Haller, Hunter, and Sanctorius Sanctorii came an unexpected dividend of natural history: 53 volumes of Buffon, E. Mendez da Costa on fossils, La Cépède on quadrupeds, and Robert Boyle's *New Experiments*, 1665. A handwritten catalogue of the "Bibliotheca Bettoniensis" exists, and these volumes, like other gifts, are identified by their original bookplates, to which we have a partial index. Until 1900, the Library's principal growth came through the bequest of private libraries such as the Bettons'.

In 1863 the College moved into its first permanent home, at 13th and Locust Streets. Construction of a building had been contemplated for some time; discussions were urged on by Thomas Dent Mütter's conditional gift of a collection of pathological specimens, which required fireproof housing. No doubt the prospect of permanency and security provided by the new building encouraged the first installment of what became the greatest gift—of any kind—which the College ever received: the book collections of Samuel Lewis. Two thousand five hundred books were presented in 1864, representing, as Stillé says (14), "the choicest works in the finest condition."

Lewis was born in Barbadoes in 1813 and was brought to Philadelphia as a young man by his uncle. He matriculated in medicine at the University of Pennsylvania; soon afterwards, he went to Edinburgh, where he fell ill of smallpox; upon his recovery he served as dresser to James Syme. After a period of travel on the Continent, he returned to Edinburgh to take his degree in 1840. Upon his return to Philadelphia, he entered private practice, but soon he began to devote his entire attention to the collection of important works of contemporary and historical medicine. In the summer of 1867 he accompanied the Hayden geological survey to Nebraska in the capacity of surgeon, and from 1872 to 1877 he travelled in Britain and on the Continent, renewing some of his former medical acquaintanceships. These are the chief events of his life of which any record can be found; shortly before his death, according to Weir Mitchell (15), he said, "as he stood in his library, 'Very soon I shall be gone, and who will take care of my books and do what I have been doing?' He spoke of them as one speaks of children." His will (a copy of which has recently been presented to the Library by John L. McClenahan) shows that he died possessed of a very modest estate; nevertheless, at his death, the Lewis Library at the College constituted more than 11,200 volumes.

At the College meeting in commemoration of Lewis on December 3, 1890, the report of which contains the only published biographical notice of any extent—he had expressly requested no memoir be written—John Ashhurst, Jr., identified some of Lewis's major contributions to the College collections as his "unequalled collection of editions of the 'School of Salerno' " (i.e., the *Regimen sanitatis Salernitanum*); a large number of works on the eye, chosen in Europe with the transatlantic advice of William

F. Norris; and a group of books on yellow fever from the library of Réné LaRoche, which with his own books, "made this [i.e., the College's] one of the best collections on yellow fever in the world" (16). It is interesting to note that no mention was made, in 1890, by either Ashhurst or Mitchell, both medical bibliophiles of stature, of what has since been generally thought the most important book in the College Library: Lewis's copy—one of three complete thick-paper copies mentioned by Keynes (17)—of the first edition of Harvey's *De motu cordis* (Frankfurt, 1628). Like most other private libraries in the College's possession, the Lewis books have been shelved according to subject; one group remains together, the "Lewis Curios," an enchanting little collection, many in miniature, beautifully bound. Handwritten catalogues of the Lewis Library exist, showing its contents at various stages, and preserving its integrity, as do its bookplates—a butterfly on a skull with the legend, "Que sais-je?"

This superb collection became the lodestone for other gifts of fine books. The mid-1860s witnessed a rapid increase in the rate of acquisition. By 1866 there were 9,513 volumes; by 1876, 17,765; by 1886, 34,234 (18), and so on. The Library Committee stepped up its acquisitions, and George Bacon Wood gave $500 annually to employ a librarian to open the reading room several hours daily. From 1868 to 1881, Robert Bridges, Fellow of the College, held this title; Mr. Charles Perry Fisher followed, serving as Librarian for fifty years; W. B. McDaniel, 2d, succeeded him in 1933, transferring in 1953 to the newly-created post of Curator of the Library's Historical Collections, and Elliott H. Morse was appointed Librarian. Thus, since the Library first began to function actively, about 1868, it has been served by only four Librarians, with very brief intervals between.

In 1882, the libraries of Charles D. Meigs, John Forsyth Meigs, R. M. Bertolet and William F. Jenks were received; in 1884, the books of Hugh Lenox Hodge, Sr., some 1,600 volumes, consisting chiefly of current materials, were contributed by his son; in 1885, I. Minis Hays, librarian of the American Philosophical Society, presented 901 volumes; in 1886, the books of John Weightman, 512 in number, chiefly ophthalmologic, were donated by his widow. Also in 1886, the Library of the Obstetrical Society of Philadelphia was received on deposit—these books are catalogued among our other books, but they remain the property of the Obstetrical Society. In 1887, the library of Nathaniel Archer Randolph was presented, 466 volumes.

Samuel D. Gross (1805-84) left his books to the Philadelphia Academy of Surgery, which he founded, to be housed at The College of Physicians of Philadelphia. (Should the Academy ever wish to dispose of the books, it must offer them to the College; happily, no such disposal has ever taken place, except the sale, by mutual consent, in 1887 of such volumes as were duplicated in the College Library.) From a figure of 3,250 volumes, after the 1887 sale, the Gross Library has grown to a total of 3,976 at present, and overflows the room named for it. After the younger Gross's death in 1889, his books and manuscripts were added, including an interesting letter-and-order book from his Civil War service, 1861-64. His widow, née Grace Revere, afterwards Lady Osler, contributed for many years to the upkeep of this collection.

Most of these libraries represent working collections of practitioners and professors, emphasizing recent nineteenth-century works, though usually including some antiquarian prizes. With the Lewis and, to a lesser extent, the Gross

collections, a deliberately retrospective orientation is introduced, reinforced in 1893 by S. Weir Mitchell's gift of 42 incunabula. (Lewis appears to have collected incunabula only incidentally—among all his thousands of books, only ten date from the fifteenth century.) In the Mitchell gift were two each of the works of Albertus Magnus, Arnoldus de Villanova, Bartholomaeus Anglicus and Celsus, and three editions of the *Regimen sanitatis Salernitanum* (19). In 1900, the library of J. M. da Costa, 2,466 volumes, very largely contemporary, was received, and in 1901, by the terms of John Ashhurst's will, the College was allowed to choose 1,500 volumes from his library. Among Ashhurst's books were important rarities: the 1491 edition of the *Hortus sanitatis*, sixteenth-century editions of Dioscorides, Cardanus, Balneis and Rhazes, seventeenth-century editions of Kenelm Digby, Celsus, Bartholinus, and Steno, and Culpeper's *Pharmacopoeia Londinensis.*

In 1901, the Library Committee purchased the collection of books and pamphlets (3,247 volumes and 2,070 pamphlets) belonging to the late John Stockton Hough, physician and would-be politician of Trenton, N.J., with the aid of subscriptions from John K. Mitchell, S. Weir Mitchell, and George Fales Baker (20). W. W. Keen negotiated the purchase—for $3,000—thus appearing for the first time as the College's semi-official rare-book agent, one of the favorite roles of his long semi-retirement. Stockton Hough collected early scientific material on human reproduction at a time when he must surely have had little competition, and, as a result, the College's collections are a prime source for seventeenth- and eighteenth-century books and theses on foetal jurisprudence, determination of sex before birth, abnormal deliveries, foetal monsters and sexual abnormalities. One volume in this collection, Fabricius ab Aquapendente's *De formato foetu*, 1600, is remarkable for having bound in, 30 paintings of the illustrations appearing in the printed volume, with variant text. Only one other set of these illustrations has been found, so far as is known (21).

Stockton Hough had also a particular interest in fifteenth-century works, compiling a list of 1,574 separate editions—not so many titles, of course—of medical incunabula. According to Fisher, 1,500 volumes and 1,039 pamphlets were retained by the College, including 76 incunabula. The duplicates and nonmedical books were sold to the University of Pennsylvania for $1,500, which must have been a bargain, even in 1901.

So, in 1907, when W. W. Keen, 71 years of age, went off to Europe on a 17-month book-buying spree, he had a considerable foundation of rarities on which to build. His bibliophilic adventures include the raising of $1,100, at home and abroad, during his absence, in addition to the smaller amount, not stated, with which the Library Committee sent him off. This sum produced 21 more incunabula, and a dozen other important rarities, including a 1593 edition in Arabic, of Avicenna—"an extremely handsome copy . . . on tinted paper, with the original parchment binding stamped with the seal and crest of the Duke of Altemps" (22) bought for $12.60—"a bargain," says Keen (23).

By 1908, the total of incunabula stood at 151; by 1915, at 187, and by 1920, 286 titles in 268 volumes. Francis R. Packard (24) printed a list of them in 1923, which was immediately rendered obsolete by the acquisition of 23 more titles that year. The annual report contains an *apologia* (25):

> These fifteenth century books constitute an invaluable collection for the student of early history and foundations of medical science.

They have been acquired for the Library without in any way interfering with the purchase of current medical publications—books, journals, etc. The Library Committee fully realize that the first object of the Library is to supply its readers with all the current medical literature. This imperative need having been complied with, it is gratifying to report that, in the course of years, we have been able to increase the extremely valuable collection of rare books, the gift or legacies of former Fellows; so that it is now a practically unique collection of the original editions of the medical classics.

Gifts of incunabula continued to be made through the depression, at the rate of two or three a year, declining to one or two annually during the early forties, and reaching the present count of 423 in 1965 (26). Packard's list was revised and republished by Charles Perry Fisher in 1931 (27), and revised again, by W. B. McDaniel, 2d, in 1938 (28), when the count stood at 409. In his *Fugitive Leaves from the Library*, (nos. 15-17, Feb.-Apr., 1937), Mr. McDaniel also issued a checklist of illustrated incunabula in the College collection, thus incidentally indexing valuable source material for the student of woodcut. In passing, it may be appropriate to note that the College acquired a photostat machine in 1916, which was employed to make photostat copies of nearly all the incunabula, and a number of other notable works. The copies were uniformly bound and have since been available for interlibrary loan.

Among donors of incunabula—and later rarities—in the first quarter of this century should be noted especially Richard H. Harte, James C. Wilson, Mr. Henry C. Lea, publisher and bibliophile, and Henry Reed Hatfield, Esq. George E. de Schweinitz, ophthalmologist and President of the College, donated, or contributed to the donation of, several early works, at least four incunabula, and one fifteenth century manuscript, *De fructibus vescendis*, by Baptista Massa de Argenta, thought to be the copy from which the work was printed in 1471.

William Osler presented, or was instrumental in securing, 54 works covering a wide range, from manuscripts to secondary bibliographic tools (29). He got up a subscription, for instance, for the *Dictionary of National Biography*. Among the incunabula, his best-remembered contribution is his proposal to S. Weir Mitchell, in 1913, to "bleed the Fellows of the College" in order to acquire the superb 1478 copy of Celsus' *De re medicina*, beautifully illuminated, which contains the signature of Giorgio Antonio Vespucci, uncle and tutor to Amerigo.

Like Osler, Weir Mitchell influenced younger men in the direction of book-collecting and set an example of generosity as donor. Beside the Gilbert Collection and the 42 incunabula presented in 1893 (to which he added at least four more before his death in 1914), a random choice of Mitchell's gifts might include Heneage Finch's *Commonplace book*, 1647, in manuscript, containing two pages of memoranda then said to be in William Harvey's own hand (30); an eighteenth-century medical manuscript in Turkish; a collection of letters on yellow fever, copied by John Redman Coxe in 1794; and a typewritten list of medical cadets (or students) who served in the Civil War as surgeons or surgeons' helpers—acquired with great difficulty, said Mitchell, from the Surgeon-General's Office. Hundreds upon hundreds of less exotic books and journals bear his name as donor—and all this was in addition to his activities for the College as fund-raiser, which contributed the larger part of the cost of the present building, and his service for two terms as President.

In 1912, the annual report of the Library mentions for the first time a

Fund for Rare Books. Until 1934, when it sank under the weight of the Depression, the Fund provided for the purchase of a surprising total of 1,388 rare books (so designated in the annual reports), 200 of which were incunabula, at a total cost of about $34,250. The Fund was fed entirely by appropriations from the Library Committee, which had as nucleus a remarkable group of book-collectors and historians: A. P. C. Ashhurst (son of John), Albert P. Brubaker, William Pepper, George W. Norris, Francis R. Packard and Edward B. Krumbhaar. Gifts from individuals continued at an impressive rate, but this Committee was quite evidently in no mood to depend on donations. The minutes for 1927 note that the Committee's expenses, exclusive of the Librarian's salary, which was charged to Council, had averaged about $18,500 over the past five years. Of this sum, about $5,220, on the average, had been spent yearly for books, of which, in turn, the Fund for Rare Books had been allotted $1,250 in 1922, $2,000 in 1923, and $1,000 in 1924, 1925, and 1926 (31). In 1923, the Fund spent $1,702.67, which brought in 19 incunabula and 21 other rarities.

The Depression began to affect Library spending in 1932. Salaries were reduced, and in the next year's report (32) it is noted that "practically no new books are being bought till the state of the funds is better." On March 6, 1934, the new Librarian—with infinite regret, surely—recommended no new appropriations to the Fund for Rare Books. President Alfred Stengel promptly gave instructions that he should be notified when works of unusual value and price should be offered for sale. In September, therefore, the Librarian reported a copy of Brunschwig's *Buch der Wund-Artzney* (Strasburg, 1497) available for $750; Dr. Stengel gave orders for its purchase, and himself contributed $250. The book was obtained on the installment plan, apparently; the last $150 being particularly hard to come by; where it came from is not stated, but the book stands on the incunabula shelf today (33).

In October, 1934, Charles Walts Burr, whose name had appeared since 1915 with increasing frequency among donors of rarities, and non-rarities, undertook to reorganize a group called the "Friends of the Library," which had presented several major works in 1931 and 1933. Burr's group raised perhaps three or four thousand dollars—changes in reporting procedures at this point make an accurate estimate difficult—and contributed a substantial number of distinguished books. In 1937 he admitted to the competitive instinct (34):

> The books which we purchase are not, for a great library, a luxury, nor do they have value merely because they are old or rare; they are books that throw important light on the history of medicine. As they are rapidly being absorbed by the public libraries, before many years, it will be impossible to purchase them at any price. Therefore, we must get them while we can.

In his youth, Burr had come under the literary and professional influence of Osler and Weir Mitchell; he was active in several learned societies, especially the American Philosophical Society; and he presented some 19,000 volumes to the Library of the University of Pennsylvania. In 1939 he made a forward-looking gift to the Library—its first microfilm reader.

Until the 1940s, medical art—except perhaps for some of the more illustrious framed portraits—had been relegated at the College to a dusty, Cinderella-like existence. Her first rescuer, in point of time, was William N. Bradley, pediatrician by specialty and student of "the medical humanities" by avocation, who ambitiously undertook to locate and photograph all existing likenesses of all

Philadelphia physicians of the nineteenth century or earlier, all Philadelphia medical buildings, and, as a sub-hobby, all known representations of Benjamin Franklin. The result was the Bradley Collection—nearly 3,000 prints, with negatives, and 17 scrapbooks, including indexes—presented to the Library in 1941. It has since served as the basic reference-tool for Philadelphia medical iconography, most notably in 1965, when it was used to compile a memorable exhibit in honor of the bicentennial of the University of Pennsylvania Medical School, called "The Art of Philadelphia Medicine."

Almost simultaneously, Samuel Booth Sturgis (also known to the Library as the donor of a 1722 edition of Eustachius' *Tabulae Anatomicae*, curiously bound dos-à-dos) generously offered to organize, rehabilitate and catalogue its large untidy accumulations of engravings and photographs. The Library Committee accepted this unusual offer with alacrity and were rewarded by the presentation of over 110 portfolios and bound volumes, containing about 2,250 engravings, 1,875 original photographs, 490 documents, and 3,650 clippings and such—all neatly mounted and, in the first three categories, catalogued. Many of these had been solicited by Dr. Sturgis as gifts; some he acquired by exchange for our duplicates; many others were his own gifts—in particular, nine portfolios of original drawings by Hermann, Erwin and Ludwig Faber, the noted Philadelphia family of medical illustrators.

Since Fisher's day, the Library has maintained a Portrait Catalogue, indexing books and journals as received; this catalogue now holds about 80,000 cards. With the Bradley and Sturgis Collections, the College therefore possesses a major pictorial archive in the history of medicine, and is actively used as a source for illustrative material by authors and publishers of works in this field.

In 1942, Francis R. Packard presented nearly 1,200 lantern slides (3-¼ x 4″) illustrative of medical history; and in 1954, William G. Leaman gave his collection of about 500 2x2″ slides on similar subjects, together with a print of a motion-picture of his own production, entitled "Medical History in Clinical Teaching." A color print of the excellent film, "Harvey and the Circulation of the Blood," introduced by Sir Henry Hallett Dale, Honorary Fellow of the College, and a set of slides and prints picturing the Presidents of the College and other notables in its history have been presented by Francis Clark Wood.

Francis R. Packard, editor of the *Annals of Medical History*, and author of the principal textbook on American medical history, stood friend to the Library in life and remained so in death. His bequest of 1,100 volumes is noted in the annual report for 1950/51 as containing primary editions of those authors on whom he himself wrote, Ambroise Paré, Guy Patin, Rabelais, and Larrey; otherwise, it consisted chiefly of what the Librarian called the "medical historian's working tools," and contributed substantially to the supportive collections necessary to effective use of early works. The next report notes the first installment of 200 volumes—not duplicating works already in the Library—given by E. B. Krumbhaar, already a frequent donor of rarities. The last installment of this gift, whose total number is not stated, was reported in 1956/57. Krumbhaar's World War I diaries from France, where Mrs. Krumbhaar assisted him in his hospital service, his correspondence, drafts of papers, and other memorabilia also were eventually deposited with the Library, providing a detailed record of a many-sided, vigorous humanist-physician. In tribute to these two notable Philadelphia figures in medi-

cal historiography, the premises of the Historical Department, when in 1957 the Curator was at last able to report their existence, were named the Packard-Krumbhaar Alcove of Medical History.

In 1958/59 was announced the award of a grant by the American Philosophical Society, which was applied toward the cataloguing of the *rariora*, and eventually put descriptions of over 750 titles into the card catalogue. In 1962, the position of Cataloguer to the Historical Collections was put on the Library's permanent roster, and a clerical assistant was added; later a second assistant was added, with primary responsiblities toward paging, book-preservation, and portrait-indexing. A second grant from the APS in 1968 was applied toward the cataloguing and preservation of some 2,500 pamphlets and toward the eventual production of a catalogue of the manuscripts.

Important gifts of books and journals by neighboring institutions began as early as 1905, when nearly 2,000 volumes were given by the Board of Managers of Episcopal Hospital. Somewhat later—the fact is stated by de Schweinitz but not the date—Packard was instrumental in securing from the Library of the Pennsylvania Hospital a gift of "over 600 rare books of which there were no copies in the College's library" (35). In 1931 and 1932, two incunabula were presented (one in exchange) by the Boston Medical Library; in 1941, the Woman's Medical College of Pennsylvania presented a third. During the 1960s, the Academy of Natural Sciences transferred a group of nineteenth-century works which had been presented with the library of J. Aitken Meigs (1829-79), but not integrated into the Academy's collections. In 1963, Hahnemann Medical College contributed a large proportion of its homeopathic collections, including many books from the library of Constantine Hering, and 200-odd volumes of homeopathic pamphlets, some of which are extremely scarce. In the same year, a valuable collection on venereology was given by the Woman's Medical College.

Franklin and Marshall College donated its medical collections in 1967, among which were several important items not in the College of Physicians Library; and in 1971, when the Piersol Anatomy Library of the University of Pennsylvania was dispersed, the Historical Department was given the privilege of choosing among the older works. These acquisitions have substantially strengthened our collections in nineteenth-century French and German works on anatomy and physiology, in particular. The Archives of the University have generously made available to us the manuscript registers of their medical matriculants, by allowing them to be copied on microfilm, and have reunited under the College roof the records of the Philadelphia Orthopaedic Hospital and Infirmary for Nervous Diseases, where Osler, Mitchell, de Schweinitz, Burr and others served.

To a comparatively minor degree, the Historical Collections have lately been able to pull themselves up by their own bootstraps. In 1971, we made available for commercial microfilming nearly 800 early American imprints, from the list compiled by Robert B. Austin (36), receiving in return the costs of our participation, and a complete copy of the microfilm, which contains about 96% of the items listed by Austin. Similarly, by selling duplicates at or near dealer's prices, we have been able to gain the capital to buy several collections of interest—especially one on vaccination—thus enriching our own collections at virtually no cost to the College.

In the 1940s and 1950s, the annual reports of the Library begin to mention

names still active among its donors, counselors, and friends: Oscar V. Batson, Samuel B. Sturgis, Samuel X Radbill, John J. B. Light, J. Monroe Thorington, Esmond R. Long, Donald C. Geist, Francis C. Wood and others. In 1959/60, the Curator remarked upon seven highly various gifts as typical of the constant thoughtfulness of Fred B. Rogers, who does not grow weary in well-doing, having been responsible for the gift, in 1973, of a group of Albert Schweitzer records and books, some of which bear his signature. This collection is of especial interest to the College, since Schweitzer was an Honorary Fellow.

Through the instrumentality of Lawrence C. Parish, with the assistance of Walter B. Shelley, an affiliation has been developed with the American Academy of Dermatology, which has produced substantial gifts to augment the Library's important collections in this specialty. Noteworthy among these was the gift of the books and correspondence of Paul E. Bechet, 1881-1962, by his widow, including also a group of nineteenth-century letters collected by Bechet as autographs. A grant of $5,000 from the Herman and Ruth Goodman Foundation has enabled us to undertake a survey of our holdings in dermatology, and to prepare the two initial installments of a bibliography of secondary sources in the history of dermatology.

Substantial gifts of money have been made in recent years toward the purchase of rare books and manuscripts. J. Monroe Thorington generously donated $5,000 in 1962 to this end; a gift in memory of Kehar S. Chouké, by his widow, in 1971, has been applied to the same purpose. A recent contribution in memory of Arthur B. Light, a former Fellow, by his daughter, through the good offices of John J. B. Light, will provide the Library with several new works on the history of drug addiction. Lastly, the gift of $250, in memory of William G. Leaman, by the Section on Medical History, at its Kate Hurd-Mead dinner, on May 16th, 1973, will procure for the Packard-Krumbhaar Alcove several important works of reference.

As Richard J. Dunglison noted, as far back as 1897, "it is now impossible, without invidious distinction, to make a comprehensive list of [the Library's] greatest benefactors" (37). Many of the most important acquisitions have been contributed by persons comparatively unknown to the College, or not directly associated with medicine. In particular, manuscripts and letters from the early days of Philadelphia medicine have been contributed by descendants of eighteenth- and nineteenth-century physicians, usually through the good offices of present-day Fellows of the College. The Historical Collections continue to depend heavily on such exertions of friendship. Above all, the Library owes a debt to its Curator, W. B. McDaniel, 2d, Ph.D., whose constant devotion over the last forty years has built the Historical Collections, demonstrated their importance and promoted their usefulness.

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Presentation of William S. Middleton, M.D., for Honorary Fellowship*

By JOHN P. HUBBARD, M.D.

In the absence of our President, Dr. Katharine Sturgis, who had an unavoidable conflict on her schedule that prevented her from being here this evening, it is my personal pleasure and signal honor to award upon a long-time friend and esteemed leader in the field of medicine, William S. Middleton, M.D., this Honorary Fellowship in The College of Physicians of Philadelphia.

We welcome Dr. Middleton, first, as a native of Pennsylvania, having been born nearby in Norristown and having been graduated from the School of Medicine of the University of Pennsylvania in 1911. He then had his internship at the Philadelphia General Hospital, known in those days to its devotees as Old Blockley. The following year he was captured by the University of Wisconsin Medical School, which has been the center of his distinguished career ever since. It is there that he served as professor of medicine from 1933 to 1960 and it is there that he was dean of the Medical School from 1935 to 1955, a notable record of survival for those who serve as deans of medical schools.

Having been a medical officer in World War I, he was a colonel and chief consultant in medicine in the U.S. Army Medical Corps in the European Theater of Operations from 1942 to 1945. After World War II, he returned to Wisconsin and later was on leave of absence from the University from 1955 to 1963 in the position of chief medical director of the Veterans Administration.

He has received many awards, honors and decorations both academic and military. To mention only a few, he is a Master of the American College of Physicians, of which he was President in 1950. He is a Fellow of the Royal College of Physicians (London). He has received honorary degrees from his alma mater, the University of Pennsylvania, from Cambridge University and from Wisconsin, the University to which he has contributed so greatly. I cannot refrain from mentioning one other, that of his association with the National Board of Medical Examiners on which he served for many years as a member of its executive committee. When in 1971, he reached the statutory limit of membership on this Board, we decided that we just could not let him go and conferred upon him continuing membership with the title of honorary consultant. I could continue at length to name additional honors that he has so justly deserved, but I believe you would prefer to know more of him through his own written words.

He has recently published a book entitled, *Values in Modern Medicine* and I commend it to your attention. It is, of course, appropriate that, as one who received his early medical education in Philadelphia, he should quote from Benjamin Franklin. From a letter addressed to Thomas Bond, Dr. Middleton, himself a master in the art of teaching, must have found special charm in the following quotation: "And to tell you frankly my Opinion, I suspect there is more valuable knowledge in Physic to be learned from the honest and candid

* Mitchell Hall, The College of Physicians of Philadelphia, 3 October 1973.

Observations of an Old Practitioner than all the formal Lectures of all the Universities upon Earth." The chapter headings in his book are themselves indicative of the author: The Patient-Physician Relationship; The Human Touch in Medicine; From the Patient's Viewpoint; Let's Give the Hospital Back to the Patients.

And finally, a more recently published paper in *Perspectives* (Vol. 15, No. 3, 1973) appears under the title of "The Practice of Medicine: Past, Present and Future." He knew the past; he has done much to create the present; and he views the future with rare wisdom. I shall read only the first and last sentences of this paper: "The present era, marked by many crises in human affairs, will doubtless take its place in history as a singularly parlous period." And the closing sentence, "Whatever may be the overt advantages of the newer knowledge, a decrement in the treasured patient-physician relationship will invite the intrusion of faith healers and other irregulars. Medicine must protect this vulnerable flank by the conscious preservation of the compassionate understanding that has marked the true physician through the ages." And then he ends with a quotation from Kipling that he himself might have worded for this occasion upon which we are surrounded in the halls of this College by great figures in medicine over the past two hundred years:

> "Down from your heaven or up from your mold
> Send us the hearts of our fathers of old!"

Dr. Middleton, the College is honored to confer upon you this Honorary Fellowship.

College Fellow Becomes Veterinary School Dean*

A Fellow of The College of Physicians of Philadelphia, a scholar and clinician who is a national and international leader in his profession has been named dean of the University of Pennsylvania School of Veterinary Medicine. The appointment of Dr. Robert R. Marshak as dean was announced on September 15 by Martin Meyerson, University president. On the previous day, the University's Executive Board unanimously approved the President's nominee for the deanship.

Dr. Marshak, a member of the veterinary school faculty since 1956, succeeds Dr. Mark W. Allam, who served as dean since 1953. Dr. Marshak will assume his new duties immediately. Dr. Allam is the new assistant vice president for health affairs.

"Dr. Marshak embodies a rare combination of talents," President Meyerson said. "In his 17 years at Pennsylvania, he has displayed the highest qualities as a teacher and faculty colleague, as a scientific investigator and as administrator of the department of clinical studies." He pointed out that when Dr. Marshak came here there was a nucleus of veterinary specialists in radiology, cardiology, dermatology, orthopedic surgery and neurology. To these Dr. Marshak has been responsible for attracting and developing talents in anesthesia, pulmonary diseases, ophthalmology, hematology, gastroenterology, animal reproduction, epidemiology and biostatistics, animal nutrition, clinical oncology, medical genetics, endocrinology and nephrology. Dean Allam shared Dr. Marshak's enthusiasm for developing veterinary specialties parallel to and in cooperation with those in human medicine. Because of the leadership of Dean Allam and his associate, Dr. Marshak, no other veterinary school can offer a broader range of education in basic sciences and clinical fields to veterinary students and veterinarians than the University of Pennsylvania. Our provost, Eliot Stellar, our vice president for health affairs, Dr. Robert Dripps, and I look forward to the School's continued excellence with Dr. Marshak as dean," President Meyerson concluded.

The new dean was graduated from the New York State Veterinary College, Cornell University, in 1945, and for the next 11 years engaged in clinical investigation and practice on dairy cattle in Vermont. His research during that period was on two metabolic diseases of cattle, parturient paresis ("milk fever") and ketosis.

In 1956, Dr. Allam recruited him to come to Pennsylvania as professor and chairman of medicine in the veterinary school. Two years later, when the faculty was reorganized into three departments, Dr. Marshak became chairman of clinical studies, the sole clinical department.

For the past 15 years, Dr. Marshak has been interested in bovine leukemia, the disease of cows that closely resembles human leukemia. His research led to the establishment in 1965 of the National Cancer Institute-sponsored Bovine Leukemia Research Center at New Bolton Center, the school's outlying facility

* News Bureau, University of Pennsylvania, Franklin Building, 3451 Walnut Street, Philadelphia, Pennsylvania 19174.

near Kennett Square, Pa. Dr. Marshak has directed this project since its inception. It is the only one of its kind in the country. Using a herd of dairy cattle in which there is a high incidence of bovine leukemia, Dr. Marshak and his colleagues have isolated and partially characterized a virus they believe causes the disease. The research may prove valuable in human health care as well.

The new dean is a member of the organizing committee and a charter diplomate of the American College of Veterinary Internal Medicine. He is a member of the American Association of Veterinary Medical Colleges and the American Association for Cancer Research, among other professional organizations.

Dr. Marshak received an honorary Doctor of Veterinary Medicine degree from the University of Berne (Switzerland) in 1968. He serves on the editorial board of the Journal of the American Veterinary Radiology Society and Cornell Veterinary.

Dr. Marshak was born February 23, 1923, in New York City. He and his wife and three sons live near Kennett Square, Pa.

Remarks to Newly Proposed Candidates for Fellowship*

By JOHN L. McCLENAHAN, M.D.

Welcome to The College of Physicians.

At this late date some of you may still be wondering what the College is and what it does. Perhaps you are asking yourselves whatever possessed you to join, and are you going to get your money's worth? Let me, a stranger to this chair, try to tell you.

Our aims are summarized in Paragraph 2 of our Charter. They state, in brief, that in this place information about disease will be collected, stored and shared and sensible suggestions for preventing or relieving pain will always find encouragement here. But that is only part of the story. If you suppose that this is nothing more than a warehouse for scholars you will never get your money's worth out of your membership. You have only to spend a little time with us to learn that this is also a garden and a self-improvement league.

Herbs grow in profusion in a green plot of ground close by this building. Stop and see them on your way home tonight and marvel at what shade and fragrance can do for you. But remember, too, that we hoe a figurative garden as well.

In Philadelphia students of medicine are clustered in six great pods, which are called Centers. Each is autonomous, sporting its own traditions, its own standards of excellence, a custom-built expansion program, a deficit and a brand of loneliness not quite the same as any other. At this moment you and I are gathered in an Anticenter! On common ground, where a neuroanatomist from a parish to the North can exchange gossip with an obstetrician from the South or with a veterinarian from as far West as 39th Street. If life cramps you in a small office or a vast Center, come here for ventilation and cross-pollination. That is our principal business. It is not a trifle.

I may have embarrassed you a moment ago by speaking of our self-improvement league. Let me put it another way. This is an approved agency with sufficient input and output to maintain a meaningful program of continuing education. The point is simply that disciplined men and women come here to instruct, question and entertain one another because it gives them pleasure to do so. The surroundings are as agreeable as we can make them. There are no politics here, or almost none, and we deviate into controversy at intervals of roughly fifty years. Some members think we're about due. But on the whole this is a service organization to which generations of doctors have come on their own initiative to sharpen their minds and exercise their imaginations.

Would you like to hear of our resources? Our library is probably already familiar to you. We subscribe to 3,200 journals, our museum contains as many fascinations, and our portraits and prints attract research workers from all over the country. Our staff is instant in service. Try them. Ask them to show you Medline, a genie that conjures up, in milliseconds, data that only yesterday required whole weeks of exile in the thickets of *Index Medicus.*

In exchange for these treasures we ask only for the satisfaction of being used and for your good will. It would add greatly to our happiness if you would

* 22 May 1973.

confirm your good will from time to time with a gift of money because we have never been rich and the roof leaks. We also welcome new ideas and considered dissent, since one falls asleep at the age of 186 without regular prodding.

Our history can be traced indirectly to Benjamin Franklin and, by stretching a little, all the way to Boston. You may remember that in 1727 Franklin and some of his Philadelphia friends founded the Junto, an association modeled on Cotton Mather's Boston Benefit Societies. Its mission was simply to serve as a forum where regular inquiries could be made into the entire state of Creation. To this end at every meeting every member responded to a searching catechism that probed every conceivable field of interest. Take Question 9, for example. "Have you or any of your acquaintance been lately sick or wounded? If so, what remedies were used, and what were their effects?"

Of course it would be vain to try to reconstruct a medical society such as ours from a single question, and I cite it only as an example of the consuming inquisitiveness of colonial Philadelphians who, very soon, fell into groups with particular interests in specific subjects. As a result the Junto soon divided into daughter cells. Some, such as The Vine, were primarily social. Others—The Library Company of Philadelphia, for example—formed the nucleus for book collections and at least two attracted citizens with an interest in philosophy and natural history. These two, The American Society for Promoting and Propagating Useful Knowledge and its virtually identical twin, The American Philosophical Society, combined with each other in 1769. Seventeen members of the new joint society were to form the core of The College of Physicians of Philadelphia eighteen years later.

Our archives contain the minutes of our first meeting, dated January 2, 1787. There were twenty five members—twelve Senior Fellows and thirteen Juniors—under the presidency of Dr. John Redman, a member of the American Philosophical Society and a trustee of what would become the University of Pennsylvania.

The beautiful alcove in which we sit was named in honor of Dr. James Hutchinson, the first secretary of the College. I take particular pride in being his successor. You can see his portrait hanging on the south wall of Mitchell Hall—a heavyset man of whom it was said that he could play Falstaff without costume. May I steal a moment of your time to tell you about Dr. Hutchinson since portraits are so flat and he was a character of such broad dimension?

He was born in Bucks County, the son of a farmer, and educated in New Jersey and Virginia. He was graduated from what was then called The College of Philadelphia before journeying to London to study medicine with Dr. John Fothergill. In 1777, while on his way back to Philadelphia, carrying confidential dispatches for Dr. Franklin, our minister to the Court of France, Dr. Hutchinson's ship was overtaken and boarded by a British man of war. He escaped and rowed to shore in an open boat with his documents, sacrificing his entire library on the packet.

During the Revolution, Dr. Hutchinson, an intimate of George Washington, served as surgeon general of Pennsylvania and after the war as professor of materia medica at the University of the State of Pennsylvania. He was physician to the Port of Philadelphia and physician to the Pennsylvania Hospital. He died at the age of 41 during the yellow fever epidemic of 1793. A healer, teacher and soldier, we could do far worse than chart our course on a career such as this. With the host of his young, talented contemporaries whose spirits know these premises, he stands as a bright example of the service that can be crowded into a single life, however short it may be.

Memorial Dedication of the Kate Hurd-Mead Lecture to William Gilmore Leaman, Jr.*

By SAMUEL X RADBILL, M.D.

It has always been customary to present a few introductory remarks before each Kate Hurd-Mead Lecture. Some of us here still cherish the memory of the occasions when Dean Marion Fay would call upon her sprightly emeritus professor of surgery, Catherine Macfarlane, to recall some of her reminiscences of Dr. Hurd-Mead who had been an associate and personal friend of hers at the Woman's Medical College of Pennsylvania.

Tonight we wish to dedicate this lecture to the memory of William Gilmore Leaman, Jr., whose recent death left another void in our midst. Born in 1898, he had taken his M.D. at the University of Pennsylvania in 1922, interned at the Hospital of the University of Pennsylvania, stayed there for another year as a resident and then, after post-graduate work at Harvard, joined William Stroud in the cardiology department of the Pennsylvania Hospital. His entire professional career was devoted to cardiology, and in 1957 he was singled out for the distinguished service and the distinguished achievement awards of the American Heart Association. For the past 40 years he has been attached to the Woman's Medical College where he occupied the chair of internal medicine, and where, beginning in 1933, he developed a course on medical history which attracted almost 100% of the students even though his lectures started at 8 a.m., and even though these students knew that no final examinations would be required. To hold the student's interest he produced a motion picture film that was later shown not only to his own classes but to other groups interested in the history of medicine. In addition, he created a large collection of slides which he used to illustrate his lectures on the history of medicine. These he generously donated to The College of Physicians where Dr. McDaniel prepared a comprehensive index that makes them useful to all who wish to borrow them. A number of stimulating essays by Dr. Leaman on the teaching of medical history also helped to innovate teaching of this subject in medical colleges in other parts of the country. Mrs. Lisabeth M. Holloway, our associate curator of the library historical collections, has thoughtfully placed many of these items on exhibit for you to see at this meeting.

During the War years, the Section on Medical History was dormant and so was the American Association for the History of Medicine, but with the encouragement of E. B. Krumbhaar, Dr. Leaman helped keep both organizations alive, holding the office of treasurer in the American Association for the History of Medicine during that association's impecunious years from 1941 to 1946, and serving as chairman of our Section here at The College of Physicians during the same period. After the war was over meetings of the Section were re-instituted, and in 1948 the Section brought the Association to Philadelphia for a most successful annual meeting.

* Read prior to the Kate Hurd-Mead Lecture XXIV, Section on Medical History, The College of Physicians of Philadelphia, 16 May 1973.

Infused with the belief that the history of medicine should form an integral part of a doctor's academic and professional background, Dr. Leaman brought together at his home on Baring Street in Mantua one afternoon the deans of all five medical schools of this city and at this meeting a series of lectures was thrashed out to be given here at The College of Physicians to the students of all the medical schools under the auspices of the Section on Medical History. Only the respect for Bill Leaman and the attraction of his charming wife, Eleanor, who acted as hosts that afternoon, could bring together under one roof the rival deans of that day. While getting them together was no mean feat in itself, getting them to agree on a conjoint program in medical history was the real miracle that came about only after they were too exhausted by argumentation to continue their objections. I think the present deans' committee of this city stems from that meeting at the home of Dr. and Mrs. Leaman.

When I was clerk of this Section in 1951, I needed some financial assistance to bring Dr. Kenneth J. Franklin from London to address the Section. With the encouragement of Professor Leaman and the aid of Dean Fay, a contribution was obtained from the Kate Hurd-Mead Class of 1888 Fund at the Woman's Medical College, and by our joint efforts the guest lecturer was able to come. This set the pattern thereafter of holding a joint meeting which then came to be called The Kate Hurd-Mead Lecture. Dr. and Mrs. Leaman would often act as host to the Section with a cocktail party before the meeting and W. B. McDaniel, 2d, and Ella Wade, the College's resourceful curators, would set out appropriate exhibits from the College collections.

I think it is clear, then, how much we here owe to William G. Leaman, and it is indeed fitting, as Dr. Katharine Sturgis has pointed out in her president's monthly letter, that this lecture tonight should be dedicated to his memory.

A Bibliographic Salute to W. B. McDaniel, 2d

By LISABETH M. HOLLOWAY, M.S. in L.S.*

In June, 1933, The College of Physicians of Philadelphia "opted a new librarian fearfully and wonderfully dight in a professional innocence that approached sublimation"[1]—or so he said, some twenty-three years later. If Walton Brooks McDaniel, 2d, Ph.D., was professionally innocent, upon his arrival at the College, from a career of thirteen years as a teacher of English and the classics at the University of Pennsylvania, Brown University and New York University, the following record of his essays, biographies, translations and editorial productions gives no sign.

In 1935 he began to issue irregularly a small mimeographed publication, aptly entitled *Fugitive Leaves from the Library of the College of Physicians of Philadelphia*, devoted to matters closely related to, and tending to the greater glory of, the College Library. Besides those articles which, having titles, could be included in the following list, the *Fugitive Leaves* contain many untitled pieces no less informative and readable, based chiefly on rare or unusual works newly added to the collection or newly discovered in it. (McD's annual reports, first as Librarian, and then after 1953, as Curator of the Library's Historical Collections, are equally worth investigating in this regard.) The *Fugitive Leaves* were temporarily abandoned in 1938 by their proprietor, who was, no doubt, somewhat pushed for time, having become in 1937 the Editor of the College's *Transactions & Studies*, a post which he surrendered, some seventeen volumes later, in 1955. In 1956 he revived the *Fugitive Leaves*, now in its "new series," which concluded in March, 1967, with n.s. no. 89, making a volume of 300 pages in all.

These brief essays and notes, modestly mimeographed on yellow paper of no great durability, and sent with the Library's *Booklist* to Fellows of the College, medical libraries, and perhaps a few friends, have become exceedingly scarce. Even now, some six years after their conclusion, an occasional letter or claim notice is received, wistfully seeking renewal.

For one year—1936—McD also edited the *Bulletin of the Medical Library Association*. In 1946 he was the Association's President, and from 1944 to 1946 he served as Secretary to the American Association for the History of Medicine. He participated actively in the formation of the Philadelphia Union Library Catalogue, and was elected President of the Philadelphia Metropolitan Library Council.

Undoubtedly his major contribution as an editor was to the *Transactions & Studies* of the College. This is, he said, on taking leave of the editorship, "as American medical society publications go, a rather old party . . . . Few American medical societies could lay themselves down on the analyst's couch with a comfortable sense of having matched the College in the discharge of this obligation to its Fellows—and, ultimately, to history." He encouraged "the inclusion of historical studies emanating from the Library and the meetings of the College's Section on Medical History," and himself contributed to it, in a

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[1] *W. W. Francis, Tributes from His Friends.* Montreal, 1956, p. 23.

limited degree. When he gave up the editorial chair in 1955, he did so, he said, because of "new College duties of absorbing interest,"[2] and these were connected with his assumption of the title of Curator of the Library Historical Collections, a title newly created for him by the College.

From these and other publications has been culled a list of articles from McD's pen, in certain principal areas of medical-historical interest: 1., Renaissance medicine, as represented by notes on, and translations of, Latin texts; 2., Philadelphia medicine of the eighteenth and early nineteenth centuries, with particular emphasis on the presentation of unpublished documents from the Library collections; 3., American medical historiography, including biographies and obituaries of historians and librarians of note; and, 4., medical librarianship and medical libraries in general, and the Library of this College in particular.

"Historiography is a serious business, I believe, because, like medicine, it is both an art and a science; an art, in that its medium is the written word, with all the power of the word to touch the emotions; a science, in that it is a pursuit after systematic knowledge."[3] Dr. McDaniel himself lived up to the obligations implicit in both aspects of his own definition. Thorough, exacting, precise, and accurate in his judgments, his work is so soundly based and so closely defined that his reader instantly pays him the compliment of confidence. And thus having put his hand, so to speak, in that of his author, and suffering himself to be led where the author will, McD's reader finds his journey unexpectedly easy and agreeable. His attention is courteously invited; the subject is laid out before him simply and directly; if he shows any signs of dozing, a gentle dig in the ribs wakes him chuckling.

This reader, who had the advantage, and the pleasure, of several years in Dr. McDaniel's professional company, would like to record her admiration and her gratitude for the privilege of collecting—and enjoying—the *opera* of this parfit, gentle scholar.

LIST OF ARTICLES ON MEDICAL HISTORY WRITTEN OR EDITED BY W. B. McDANIEL, 2D

An account of the College of Physicians of Philadelphia, by George E. de Schweinitz and W. B. McDaniel. In commemoration of the 25th anniversary of the College's installation in its present home. 2d ed. *Trans. & stud., Coll. Phys. Phila.*, 4th ser., v. 2, suppl. no. 1, 1934.

The affair of the "1613" printing of Johannes Rümelin's "Catoptron." *Trans. & stud., Coll. Phys. Phila.*, 4th ser., 6: 60–72, 1938.

American Aesculapian Society: (Manuscript) Constitution—Bye [sic]-Laws—Library regulations—New York. *Fugitive leaves, Library of the Coll. Phys. Phila.*, n.s. no. 77, March, 1965 (7 p.).

Angina inflammatoria (diphtheria?) as described in David Orme's Edinburgh dissertation (1749) and Benjamin Morris' Leyden dissertation (1750). In Essays in the history of medicine, presented to Professor Arturo Castiglioni on the occasion of his seventieth birthday, April 10, 1944, *Bull. hist. med.*, suppl. no. 3: 103–129, 1944.

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[2] Editorial, *Transactions & Studies, Coll. Phys. Phila.*, 4th ser. 22: 161, 1955.

[3] The place of the amateur in the writing of medical history. *Bull. hist. med.* 7: 687, 1939.

before the Biological Sciences Division of the Special Libraries Association, Philadelphia, 9 June, 1965.)

A brief sketch of the rise of American medical societies. In: MARTI-IBAÑEZ, Felix, ed. *History of American medicine; a symposium*. New York, MD Publications, 1959. Pp. 133–141.

Catalogue of "Open-House" exhibit. *Fugitive leaves, Library of the Coll. Phys. Phila.*, n.s., no. 5, June, 1956. (2 p.)

Catalogue of the Hering and College Paracelsus Collections. *Fugitive leaves, Library of the Coll. Phys. Phila.*, n.s., nos. 7–9, Oct.-Nov., 1956 (9 p.).

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A checklist of illustrated incunabula in the Library of the College, with a subject index of the illustrations. *Fugitive leaves, Library of the Coll. Phys. Phila.*, nos. 15–17, Feb.-Apr., 1937 (4 p.).

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Memorial Service for John Heysham Gibbon, Jr., M.D.*

Introduction:
Francis C. Wood, M.D.
Professor of Medicine
University of Pennsylvania

Speakers:
Charles Fineberg, M.D.
Professor of Surgery
Thomas Jefferson University

Katharine R. Sturgis, M.D.
President
The College of Physicians of Philadelphia

Rudolph C. Camishion, M.D.
Professor of Surgery
Thomas Jefferson University

Jonathan E. Rhoads, M.D.
Professor of Surgery
University of Pennsylvania

Francis C. Wood, M.D.
Professor of Medicine
University of Pennsylvania

Dr. Wood: This memorial service has been planned by Maly and her family for all of Jack's friends, non-medical and medical. It is being held in this building because of Jack's long deep devotion to this College of Physicians of Philadelphia. Both he and his father were presidents. Moreover, if you look back in the dusty archives, you will find that the first physician in the Gibbon family became a Fellow 185 years ago, in 1788, a year after this College was founded. For those reasons, we are here in S. Weir Mitchell Hall.

Five people will speak to us this afternoon. The first is Dr. Charles Fineberg, who was one of Jack's early residents.

Dr. Fineberg: Mrs. Gibbon, as I look out at this large audience, family and friends of Dr. John Gibbon, I see many familiar faces of former residents, colleagues and associates in Dr. Gibbon's Department of Surgery. The few brief remarks that I make this afternoon I offer for all those former residents and associates of Dr. Gibbon. This group of men and women are welded together by a kindred spirit, inspired by Dr. Gibbon, a comradeship which was the most unusual that I have ever encountered in my adult life and which has lasted until this very day. The fact that many of his former residents have travelled at very short notice from distant areas of this country and other countries to be here this afternoon shows the feeling that each of us has for our former professor and chief. The intensity of our feeling and the closeness of our association is almost inexplicable. I believe it is based on the precepts of Dr. Gibbon: hard work and doing the very best that one can for the patients entrusted to him. Dr. Gibbon always insisted on absolute intellectual honesty and complete dedication to the practice of medicine. Dr. Gibbon's contributions to humanity and science have earned for him recognition that will be everlasting. However, of more importance is the fact that he is the tap-root of a tree which has grown to cover all areas of this country and other countries. He is and was the stimulus for

* These memoirs, transcribed from a tape recording, were read at a memorial service held in Mitchell Hall of The College of Physicians of Philadelphia, 13 February 1973.

teaching of the principles that are being handed down to others, and these principles will be continued wherever the good practice of surgery is carried out.

I would like briefly to say a few words to Dr. Gibbon's family, especially to his children. It was very difficult for Dr. Gibbon to show emotion, but behind this veneer was one of the softest and kindest and most devoted and liberal human beings whom I have ever known. He loved young people. He spent a great deal of time with young people. And he often spoke to me of the great sacrifice that a physician has to make, especially regarding his own personal family. With the many tasks that he had in teaching, in the care of patients and in the editing of the *Annals of Surgery* and the Research Laboratory, there were not enough hours in the day to spread them over all the areas he wished; he often spoke about this lack of ability to give to everyone. For the many hours that he gave to us and took from you, we ask your forgiveness, but we also ask you to remember that all those hours and the dedicated work of both your mother and father have now made it possible for many infants, young people and adults to enjoy a normal existence where twenty years ago this would have been impossible. An accomplishment such as this can never be evaluated in hours. The importance and substance of what I have briefly said is this—I hope that the beloved family of Dr. Gibbon will take comfort in the fact that, although he has been physically removed, through us, his former residents, his colleagues and his friends and what we do in the future, I am really sure John Gibbon will never die.

Dr. Wood: The next to speak to us is Dr. Katharine Sturgis, president of this College.

Dr. Sturgis: Jack Gibbon was the least pretentious, least stuffy person I have ever known. Handsome, innately elegant, brilliant, original, he was comfortable without conceit, happy without arrogance, and compassionate without condescension. He loved people—all sorts of people—loveable people like Bill McClenahan, controversial people like his old friend Ben Spock. He accepted folks as they are, knew their basic goodness, and forgave their pecularities. He had unerring taste. He was in love with living, with swimming in his pool at Lynfield Farm or at the Hopkinson place in Manchester or in the Caribbean to which he had anticipated flying next Saturday. Tennis was his favorite sport; its swift clean action was just right for his pace. He adored his family, and as he told me after their fortieth anniversary celebration in 1971, "We had them all home under one roof, children and grandchildren, spilling all over the place"; his eyes danced.

Jack was a man of few words and much wisdom, who saw to the heart of things quickly. His physical beauty was accompanied by glowing beauty of the spirit. His door was always open. His phone was always available. He loved to paint. As one sat for him he looked much as he does in the color photos downstairs with straw hat, jeans and a pink shirt. One became aware of Jack's love of the land and of the sheep that nibbled spring grass on the gentle hills outside the window, of his pride in his surgeon father's ability as a stone mason. As Jack chose colors critically, gauged sizes, concentrated on his canvas, Maly was a frequent consultant as she had been his working partner for nineteen years while they perfected the heart-lung machine. On several occasions, he told me that few recognized Maly's role in his achievement.

Jack's relationship to his dogs was charming. He told me about the acquisition of Wendy, their collie. A knock on

the door. There was a golden-haired young man with a darling collie puppy. "She followed me," the young man explained. "I really can't keep her. I am a student at Swarthmore, and I am looking for a good home for her." And Jack said, "I told him we would have to talk it over with Maly, but I knew she couldn't resist the puppy—or the young man." And so Mark and Wendy came into their lives, sent to them when they would have great need of both of them.

I first met Jack when he was president of the Laennec Society and I a member of the Executive Committee which met in Jack's office once a month. Over the years I watched him in action, not in the operating room, but in his relationship with colleagues, friends and family. I grew to love this man, as did all who worked with him. Sensitive but stubborn; sweet but with strong opinions; gentle but a tower of strength. I watched him receive the Philadelphia Award, but missed his most recent occasion of honor, the Dickson Award of the University of Pittsburgh. Typical of his simplicity was the fact that, as he improved the heart-lung machine, he used parts of his original apparatus for the newer set-up and threw out what he did not need. So, when the Smithsonian Institute requested the first apparatus, it couldn't be produced. He and Maly never dwelt on the magnitude of their achievement; had no pride in the original unit but only a burning desire to perfect it for use on humans.

Two years ago I mentioned to Jack that I was in heart failure. Amazed he asked, "Why?"

"I told you that I had aortic stenosis for years."

"You never did. You must have a new valve put in at once. I will call and tell you to whom you should go." That very night he telephoned and gave me a choice of two surgeons. He made the arrangements by long distance telephone at once. Quick thinking and assumption of full responsibility were characteristic of Jack. He was calling a meeting of The College of Physicians Nominating Committee which he chaired so that all would be in order before he left for his Caribbean holiday. Maly and I were planning a celebration at this College for the twentieth anniversary of the first use of the heart-lung machine on a human being. Jack knew of our plans, and I am so glad that he did. He was delighted, but felt that he should not be involved.

The very morning he and Maly were playing tennis so happily, I was trying to reach Maly to tell her I had accomplished some of our plans for May 5. For two hours I couldn't reach Lynfield Farm. Then Maly answered and told me that a half hour before, we had lost Jack. The shock was stunning, but then I realized, as all of you did, how right it was that Jack went down as he lived—with flair, joy and in the companionship of his darling wife. It is fitting that we pay tribute to John Gibbon here where he presided with such dignity and grace through the years of his presidency of this College. We cannot part with Jack; his vigor, sweetness and encouragement are an integral part of us.

Dr. Wood: The third to speak to us will be Dr. Rudolph Camishion, another one of Jack's residents.

Dr. Camishion: Mrs. Gibbon, family and friends, it is indeed an honor to participate in this tribute to Dr. Gibbon, an acknowledged great man. My entire professional life centered about him, first, as my teacher when I was a student, as my chief when I was a resident, as my associate in practice, and as my dear friend.

When I was a young resident, my wife once said, "I must meet this Dr. Gibbon. Does he have a family and a home, or does he ascend Olympus each night after work?" She came to know him well and to love him as I did.

It is easy to understand why any man should wish to emulate Dr. Gibbon. Others will speak of his monumental contributions to medicine. Obviously, these are an important part of his life and part of the man, but he was so much more than a superb academician. He was a man of dignity, integrity, exacting honesty, humility, scholarship and a clinical surgeon completely devoted to his profession. Thus, it becomes clearly evident how he inspired those who surrounded him. He believed that his most important function as a departmental chairman was to provide an opportunity for his house officers and staff to excel. This he did freely and with anyone who showed interest. He told his residents that you cannot be a surgeon eight hours a day; you must be a surgeon in the way you think, act and live every moment of your life. Characteristically he did what he said. Daring, but cautious. Courageous, but acknowledging the risks. He died as he lived, still an inspiration to us all. He left a large surgical progeny to carry on. I doubt that any of us shall ever forget what he gave.

Dr. Wood: Now we will hear from Jack's long-time friend, former neighbor and surgical colleague, Jonathan Rhoads, professor of surgery at the University of Pennsylvania.

Dr. Rhoads: You have heard Jack Gibbon's life was interwoven with those of many here. When he returned from Boston, with him he brought Maly and the first model of the heart-lung machine on which they had carried out acute experiments in animals. He took up his clinical work at the Pennsylvania Hospital with John Flick, and came to the Harrison Department of Surgical Research at the University of Pennsylvania and carried forward his research. It was there that I first knew him. Jack and Maly were spending nearly half a day every day in the laboratory, and both their family and ours were attracted by the Illman-Carter Unit, the University's demonstration school. So we ended up living across the street from it, and finally as next door neighbors in the 4000 block of Pine street.

Dr. I. S. Ravdin, as director of the Harrison Department, was so impressed with the possibilities of the heart-lung machine and with the intelligent and vigorous way in which Jack was advancing the problem that he devoted a major part of his then slender budget so that a new and much improved model could be built. With this model, the Gibbons were able to achieve permanent survival of cats whose hearts had been stopped for as long as twenty-five minutes. One of these animals became a household pet in our neighborhood and lived for a long time. With one of the neurosurgeons, the Gibbons showed how brief a time the cat's brain could tolerate having the circulation stopped. Indeed, there were no permanent survivors without the machine if this occurred for more than six or seven minutes.

It was Jack who proposed me for the Society of Clinical Surgery, a small society with a distinguished history. This well-travelled society permitted me to see a great deal of the best surgical endeavors throughout the United States. It was Jack who shortly after the war became chairman of the Editorial Board of the *Annals of Surgery*, and he advised me to become a member. Many were the times that we conferred on manuscripts, so we came to know each other's way of thinking fairly closely.

On his fiftieth birthday, Maly invited us to a party at their home where his friends and family put on short skits illustrating different phases of his life. I remember particularly one which I think his sister did, emphasizing their journey together to Europe as teenagers. She portrayed him as so interested in books that he devoted almost more time to

reading than to looking at the scenery. Later, he showed the remarkable quality of decisiveness about priorities which always characterized him.

A brilliant student, he was well-educated, but was never one to lose the vision of the forest because of his interest in the trees. He would see the main picture and direct his efforts to that which was most important. He talked little about himself. He was graduated from Princeton at the age of nineteen and finished Jefferson Medical College four years later with an M.D. He held the degree of honorary Doctor of Science at the University of Buffalo, Princeton University, the University of Pennsylvania, Duke University and Dickinson College. He devoted the war years to service with the Pennsylvania Hospital Unit in the South Pacific and eventually became the chief of the Surgical Service at the Mayo General Hospital in Galesburg, Illinois. He returned to the University of Pennsylvania as Assistant Professor of Surgery in 1945-46, but was almost immediately appointed professor of surgery and director of surgical research at Jefferson Medical College. He served in that post for ten years, at which time he became the Samuel D. Gross Professor of Surgery and head of the Department of Surgery, in which capacity he served an additional eleven years. He received the Albert Lasker Medical Research Award. He was an Honorary Fellow of the Royal College of Surgeons in England and both a member and past-president of each of the following: the Heart Association of Southeastern Pennsylvania, the Society for Vascular Surgery, the American Association for Thoracic Surgery, the Society of Clinical Surgery and the American Surgical Association, as well as The College of Physicians of Philadelphia.

He was the author of a textbook on thoracic surgery which he revised after his retirement, of many chapters in books, and of many original scientific papers.

His great contribution was the development and successful demonstration of the apparatus which permits the circulation to be carried on outside the body by an artificial heart and artificial lungs. After the most careful and controlled experiments with animals, he applied this experience in the treatment of a patient with a septal defect at the Jefferson Hospital in May, 1953. The apparatus was successful, the operation was successful, and the patient recovered. The method was widely applied and still further developed in many centers around the world. Its discovery was prerequisite to most of the applications of surgery to heart disease, and its impact on the lives of the human race is immeasurable.

With the clarity of thought which characterized him, he cut off his surgical career sharply when he retired from Jefferson and devoted himself to the hobby he had pursued for many years, that of painting and portraiture. He had the advantage of natural talent and the encouragement and criticism of his distinguished father-in-law. Mr. Hopkinson's career in the Fine Arts included his being commissioned to paint the portraits of Calvin Coolidge and of many other distinguished people.

When you were with Jack Gibbon, however, you always felt him as a person, rather than as a surgeon, or a scientist or an artist. Possibly my favorite recollection of him is standing with Jack at a reception at the American Surgical Association. Our eyes turned across the room to where Maly was chatting with a group of people. His gaze lingered and his face softened, and he said entirely spontaneously, "Isn't she lovely?" And, of course, she was and is. But coming after more than thirty-five years of married life, this statement was

some indication that his personal life was as rich as his professional and scientific life. His life was neither very short nor very long, but it was very complete; and, as he would have had it, it stopped while he was in full possession of his remarkable faculties. He has left innumerable close friends much indebted to him, and all mankind much the better for his great contribution to medicine.

Dr. Wood: My function now is to try to fill in the gaps, if there are any. A word about Jack's family life. He was so busy during the winters while he was professor of surgery that most of his family's recollections are of the summer: swimming—no water was too cold for him; tennis—he was very good; chess—for years he could beat all comers. Square dancing, painting, charades, and acting—whatever he did was always done, I am told, with 100% involvement and enthusiasm.

I like to remember how, just home from the war, he had to leave the dinner table the first evening when his homecoming emotions overcame him. I like to think of him at college. He was Princeton 1923—I was Princeton 1922. I never knew he was there and vice versa. When I was a sophomore, I took a course in social psychology. One day, we had to choose ten members of our class who were going to the top of the world and ten who weren't. My choices were completely backwards. I thought that the big men on campus at whom I had looked up through my shy little compartment would be our future greats. Actually only two of them ever were, Adlai Stevenson and Donald Lowry. The men who became outstanding in later years were not very noticeable in college, just like Jack. It should comfort many who are now in college spending their time learning rather than socializing and politicking. Did you know that Jack wanted to be a poet even after his first year in medical school?

I like to remember one day in the early 1950s, when Jack was making tests of his heart-lung machine on dogs, and he invited me to come down to Jefferson and watch him in his operating room. He cut a hole between the two upper chambers of the heart, making an atrial septal defect, and then sewed it up. A week later that dog was running around healthy and happy. I had absolutely no idea until I saw with my own eyes that one could open the heart, work in a bloodless field, and then sew it up a half an hour later and have it function normally. Three years later Jack did that very operation closing an atrial septal defect on Cecelia Bavolek, the first successful open heart operation using the heart-lung machine. He was so wound up after that operation that he couldn't write up the operative report for the record.

I like to think of that day in 1935 when Jack and Maly (you know, he stole Pete Churchill's technician and married her in 1931) were first able to clamp completely the pulmonary artery of a cat and maintain the heart and lung function with his machine. And I love to picture Jack and Maly dancing for joy all around the laboratory then and there. I also like to remember that eighteen years elapsed between this experiment and the first time he used the machine on a human patient. He was not one to rush through things and grasp for the glory of priority. He was like the man in the First Psalm—"And he shall be like a tree planted by rivers of water that bringeth forth its fruit in its season."

I like to remember Jack as president of this College, standing up there in all his natural dignity and handsomeness, presiding over our meetings. I also like to see Maly in the audience. I like to remember what one of Jack's students told me about him: he was respected as number one among all the teachers, he was available to the students, he was

deeply interested in seeing them and talking to them and trying to help them with their problems. This chap said he treated you like an equal, not an inferior. He was never condescending. You can just see what that student saw, can't you? When you are a real man, you don't have to try to look like a big shot. This is one of the things I have noticed about the truly great men whom I have known, of which, of course, Jack was one. They have no facade. They are right there before you, separated by no barrier. What a treat it was to be with Jack. No pretense.

I should like to put Jack's heart-lung machine accomplishment in some sort of perspective, at least to give you the perspective of one who has watched the management of heart disease develop over fifty years. Until Jack came along and did his basic, fundamental painstaking work and accomplished his dream, there was no chance to operate upon the heart systematically and to deftly correct important defects. In my younger days, we didn't even try very hard to diagnose some of the congenital defects because there was nothing you could do about them. This has all changed, and I rank Jack's accomplishment high on the list of major medical breakthroughs in world history, quite close to that of vaccination, anesthesia, aseptic surgery and antibiotics in the help it has brought and will bring to thousands.

It has always been hard for me to realize that anyone I knew well and liked could ever amount to anything, but, by Jove, Jack did!!

In conclusion, Jack and Maly are a pair of all-around patricians and thoroughbreds, in their heritage, in their intellect, in their appearance, and in their character and spirit. What a privilege it has been for us all to know and love them!

Twentieth Anniversary of the First Successful Open Heart Operation Using a Heart-Lung Machine

In honor of John H. Gibbon, Jr., a symposium, reception and dinner to commemorate the twentieth anniversary of the first successful open heart operation using a heart-lung machine were co-sponsored by The College of Physicians of Philadelphia and the Jefferson Medical College of Thomas Jefferson University at The College of Physicians on May 5, 1973. The operation was performed by Dr. Gibbon on May 6, 1953, at the Jefferson Medical College Hospital.

Co-Chairmen

Katharine R. Sturgis, M.D.
President
The College of Physicians of Philadelphia

Peter A. Herbut, M.D.
President
Jefferson Medical College, Thomas Jefferson University

PROGRAM

A Symposium on Open Heart Surgery

The Use of the Heart-Lung Machine in Congenital Heart Disease
James R. Malm, M.D.
Professor of Clinical Surgery
Columbia University
New York City, New York

*The Use of the Heart-Lung Machine in Coronary Bypass Procedures**
W. Dudley Johnson, M.D.
Associate Professor of Clinical Surgery
Medical College of Wisconsin
Milwaukee, Wisconsin

*The Use of the Heart-Lung Machine in Valvular Disease**
Denton A. Cooley, M.D.
Surgeon-in-Chief, Cardiovascular Association
Texas Heart Institute
Houston, Texas

"John H. Gibbon, Jr., As I Knew Him"

Clarence Crafoord, M.D.
Professor Emeritus of Thoracic Surgery
Karolinska Hospital
Stockholm, Sweden

* Manuscript not submitted.

Clarence Dennis, M.D.*
Professor of Surgery
State University of New York
Downstate Medical Center
Brooklyn, New York

Harris B. Shumacker, Jr., M.D.
Distinguished Professor of Surgery
Indiana University School of Medicine
Indianapolis, Indiana

Presentation of the Charles Hopkinson Portrait of John H. Gibbon, Jr.

Mrs. John H. Gibbon, Jr.

Hopkinson, the Portraitist and the Man*

Perry T. Rathbone
Director Emeritus
Museum of Fine Arts
Boston, Massachusetts

The Use of the Heart-Lung Machine in Congenital Heart Disease

It is a particular honor for me to participate in this program on the twentieth anniversary of the first successful open heart operation utilizing mechanical support, bringing together this group of distinguished scientists, physicians and friends to relive and appraise this great contribution of Dr. John Gibbon.

Dr. Gibbon was chief of A Service at the Pennsylvania Hospital when I began my internship there in 1949. I particularly remember his rounds and the special interest he had for the patients admitted for the new and challenging operations of closed mitral and aortic valve commissurotomy. My own interest in cardiac surgery began at that time. The house staff all knew that very special research was being conducted at the Jefferson Surgical Research Laboratories by Dr. Gibbon and his associates. Following the successful open heart operation for atrial septal defect on May 6, 1953, Dr. Gibbon turned his attention with his usual vigor and enthusiasm to the position as Chairman of the Surgical Service at the Jefferson Medical School. He left the extension of his great contribution and the development of refined surgical techniques for complex defects to others. Several years later he wrote, "I remember my dislike of opening a surgical journal and finding it full of articles on open heart surgery, thinking, I suppose, that I had opened some kind of Pandora's box." During the scientific portion of this evening, Drs. Johnson, Cooley and I will attempt to look into Pandora's box and review its output.

Last year approximately 50,000 open heart procedures were carried out in the United States of which 50% were for coronary artery disease, 35% for ac-

* Manuscript not submitted.

quired heart disease and 15% for congenital heart disease. This latter figure represents some 8,000 open heart operations performed on children with cardiac birth defects. In 1953 surgical correction was feasible for atrial and ventricular septal defects, pulmonic stenosis, aortic stenosis and Tetralogy of Fallot. The risk of correcting atrial and ventricular septal defects had always been less than 10%, and today the success rate in these defects, when uncomplicated, is over 98%. Tetralogy of Fallot is a more complex defect and the mortality in 1959 was 25% and now has been reduced to below 5%. In our own institution we have operated on 150 consecutive patients with Tetralogy of Fallot without an operative death. The development of a better understanding of the physiology and problems of reconstruction of this complex defect and particularly the safe support time provided by mechanical bypass has greatly contributed to this improved survival. Subsequently, the complex congenital anomalies, transposition of the great vessels and truncus arteriosus have been corrected by ingenious reconstructive methods incorporating not only cardiac bypass but the use of hypothermia to provide optimal visualization to perform these complex operations. At the present time approximately 90% of children with congenital cardiac defects have lesions which are correctible or can be improved by open heart techniques.

In 1970 the Columbia-Presbyterian Babies Medical Center had a reunion of all patients who underwent open heart surgery during the past years. One thousand children were among those invited to attend. One cannot imagine the personal satisfaction and gratification in seeing this large number of healthy, rehabilitated children returning to renew friendships with their doctors, nurses and institution. One could not achieve this five to ten year 95% follow-up among patients operated on for carcinoma of the lung. It is to be noted that the cost of operation, utilization of health care facilities and professional personnel is comparable for the two procedures. Yet, there are still critics in our society who state that the economic and medical facilities of this country cannot afford the cost of rehabilitating and perpetuating children with congenital anomalies. Let us look closely at one follow-up group.

A group of 64 patients underwent post-operative catheterization following correction of Tetralogy of Fallot and have been followed 7 to 11 years following operation. This group is particularly unique in that the catheterization gave us a clear documentation of the hemodynamic result. Ninety per cent of these patients had good to excellent cardiac hemodynamics. Only six were considered to have poor results and the only two late post-operative deaths occurred in this group. Irrespective of their hemodynamic result, 55 were in or completed high school, 22 were attending or completed college and 1 was in post-graduate study. Only one patient was considered a high school "drop-out" and no patient was in trouble with the law or was a drug addict. This would be a remarkable record among our normal population in this day and age. They subsequently were all employed, including jobs as teachers, clerks, nurses and a number of happy, well-adjusted housewives. The obstetrical history is of particular interest and among the twelve women in the group, there were twenty pregnancies with fifteen living births. Several had spontaneous abortions or therapeutic abortions. It is of interest that thirteen of fifteen children were normal. One infant had a ventricular septal defect and one Tetralogy of Fallot. Six male patients have become fathers and there were eight normal progeny. Data such as this is now

accumulating to indicate that patients with congenital cardiac defects, which have been completely and correctly repaired, have a life which is both qualitatively and quantitatively normal.

What is the future direction of surgery for congenital heart defects? There are strong social, economic, cardiac and child development reasons for repairing these anomalies before school age. Certain life threatening anomalies must be repaired within the first year of life. Experience during the past five years has provided evidence that such operations are feasible even in infants less than six months of age. Infant open heart surgery has placed new demands on support techniques of heart bypass and post-operative care. A disposable low prime bubble oxygenator has now been developed which requires less than 500 cc to prime. This is in marked contrast to the 2500 to 3000 prime for the original heart-lung machine. The equipment is miniaturized to meet the small stroke volume of the infant heart which is between 5 and 10 cc per minute in contrast to 50 cc per minute in adults and to meet the high oxygen demands of the infant. There are certain congenital anomalies such as total anomalous pulmonary vein drainage for which there is no palliative procedure and the mortality is 80 to 90% in the first six months of life without treatment. The prognosis for this and other anomalies has been dramatically reversed by carrying out total repair in infancy. Our youngest survivor was two weeks of age in this group and is now a bright, productive, healthy girl of two years. Table I shows results among 62 infants under one year of age operated on at the Columbia-Presbyterian Babies Hospital. The direction is clearly for early complete repair of cardiac defects and most of them should be repaired before school age.

There is good data now available on the incidence of congenital heart disease in the general population. There are eight children born with congenital heart disease among every 1,000 living births and three of these infants die in the first year of life, often within the first few hours of life. At the present birth rate of 15.5 living births per thousand population, it is estimated that approximately 15,000 children with correctible congenital heart disease are born yearly and survive until the first year of life. There is therefore a finite number of children in this country with surgically correctible heart disease. Last year a total of 275 hospitals reported performing open heart surgery for congenital heart disease. This represented, among a total of 8,000 operations, less than 35 cases per institution per year. A certain number of institutions, including our own, reported performing over 150 cases per year and one wonders what the experience at some centers might be—even less than 10 cases per year. The low caseload experience reported by these hospitals agrees with figures reported from approved thoracic training programs and by candidates applying to the American Board of Thoracic Surgery. It is apparent that

TABLE I
Infant Open Heart Surgery—April 1973
Columbia-Presbyterian Babies Hospital

	0-6 wks.	6 wks.-3 mos.	3-6 mos.	6 mos.-1 yr.	Total
# Patients	16	9	23	14	62
Survivors	11	6	19	11	47
Survival Rate	(70%)	(67%)	(82%)	(79%)	(75%)

most residents have a small experience with repairing these defects and some have had none. It is difficult to establish what constitutes the optimal number of operations to remain proficient in this complex field but certainly 30 cases per year per institution seems too low.

Dr. Gibbon's Pandora's box is now revealed. I think he was concerned that the quality of cardiac surgery, particularly in the field of congenital heart disease, might suffer as programs proliferated. His whole surgical life was characterized by the value of quality and our responsibilities today are not only to build on his contributions, but we must implement quality controls of no less standard than Dr. Gibbon set for himself and his patients. This responsibility falls on those of us who are fortunate enough to follow him.

James R. Malm, M.D.

"John H. Gibbon, Jr., As I Knew Him"

I feel deeply honored and moved to have been asked to say a few words on this occasion. This day, which was meant to celebrate the twentieth anniversary of the first successful intracardiac operation in man with the aid of a heart-lung machine, is now, by tragic circumstances also devoted to the memory of the man who was the first to perform this successful operation, the late John H. Gibbon, Jr.

His work demonstrated for the first time that extracorporeal circulation could be successfully accomplished in man by drawing venous blood from the patient, oxygenating it, and pumping it back into the arterial system with the help of a heart-lung machine, thus making it possible to open the almost empty heart and operate inside this organ at a deliberate pace. Several surgical investigators had tried to do this before but none had so far succeeded. This major event in the field of heart surgery, which took place on May 6, 1953, became a tremendous incentive and spurred continued investigations in this area in the years that followed. It is sad that despite this pioneering effort, his own life could not be saved by a similar effort when on February 5 of this year he was taken away from us by a circulatory disturbance within his heart's own vascular system.

I first really got to know Jack Gibbon back in 1939 at a meeting of the American Thoracic Surgical Association in Los Angeles. Although we had not met before, we both had developed a common interest during our initial surgical activity, namely, the post operative thrombo-embolic problem, and we were both concerned with developing the means to save patients afflicted with life threatening pulmonary embolism. As a result, we rapidly established a close relationship. We had both realized the significance of the discovery of heparin, of its mode of action and its implications in counteracting the effects of thrombo-embolism. Jack Gibbon attacked the problem of pulmonary embolism from the point of view of acute surgical intervention. My own efforts in the late twenties and early thirties were mainly directed towards preventive treatment in order to decrease the frequency of thrombo-embolic occurrence in newly operated patients, and later on from 1934 to 1935 toward the possibilities of preventive heparin administration.

The importance of rapid diagnosis and rapid intervention for pulmonary embolism had already been well emphasized. But we both realized that with the techniques available at the time, the saving of a patient threatened by major pulmonary embolism would be the ex-

ception rather than the rule. His original idea was to counteract the abrupt interruption of the pulmonary circulation, by diverting blood from the venous side of the heparinized patient into an apparatus where it would be oxygenated before being returned to the arterial side. Under these conditions, the life of the patient would be sustained and enough time gained in order to make a precise anatomical diagnosis, to open the pulmonary artery and remove the large clots that had become dislodged from peripheral sites, migrated through the right heart and blocked the pulmonary circulation.

I remember how tremendously impressed I was in 1939 when I was allowed to participate in experiments on heparinized cats during which Jack Gibbon diverted the animal's venous blood inside a rotating cylinder where it formed a thin oxygenated layer, prior to being reinfused into the arterial system by means of a special pump. During the procedure, the heart was completely bypassed for up to one hour and bright red arterial blood could be seen circulating in the arteries of the retina. I remember feeling a sense of elation, very much like the one Jack and Maly had felt in 1935, when for the first time they were able to take over the entire cardio-pulmonary function of a cat with an extracorporeal circulation. Jack has told me that when they completely clamped the pulmonary artery and saw the blood pressure and blood oxygenation seemingly normal, they exploded with joy and danced around the laboratory. Witnessing the same thing four years later, I also felt that this constituted a tremendous break-through.

During these experiments and the discussions that followed, I and Emil Anderson, a research engineer who accompanied me, were impressed by Jack Gibbon's winning personality, by the abundance of his ideas, by his calm sensible judgment, by the openness and honesty of his efforts. We ourselves had discussed the possibilities of designing an extracorporeal perfusion system along the same principles but there in Jack Gibbon's experimental laboratory, we witnessed the performance of such a system in actual operation.

During this first visit to Philadelphia, I also met Jack's wife and scientific collaborator, Maly, and their three oldest children and the foundation was laid for a lifelong friendship between us which over the years also developed into a friendship between our families.

During the Second World War, we in Sweden became almost completely isolated and my contacts with Jack Gibbon were interrupted. It was not before the spring of 1946 when he came home from the Pacific theater of operations that we could again get in touch with each other. During the war years, we in Sweden had experimented with various techniques for oxygenating venous blood and reinfusing it into the experimental animal. I was therefore very eager to meet with him again.

This opportunity arrived in 1946. In March of that year, I wrote to him in order to find out if he was back in Philadelphia. Before he received my letter, he had already written to me asking me to come to his home on Pine Street, stay with him and his family and resume the discussions concerning problems of mutual interest which we had had to break off 7 years earlier in 1939. It seems to me that it must have been something like thought-transference between the two of us as our letters crossed each other on their way over the Atlantic.

Between 1946 and 1953, we met at least once a year mostly in America, but Jack came to see us in Sweden once together with his oldest daughter and also a couple of times with his wife. During these visits and in the intervals

through exchange of correspondence, there was always a close contact between our two groups and information as to how the work was progressing was frequently exchanged. We were trying in different ways to solve many technical problems and to develop an oxygenator. On May 6, 1953, Jack and his team successfully used their heart-lung machine on a patient for the very first time. Encouraged by this result, I and my collaborators, Viking Olof Bjork and Ake Senning, were able the following year, in 1954, to successfully remove a left atrial myxoma, preoperatively diagnosed with cardio-angiography under total cardio-pulmonary bypass. Both of these patients are still alive and well today.

Because of the very high moral qualities of Jack Gibbon as the leader of his group, there was never any secrecy between us. On the contrary everything lay quite open for both groups to see and to discuss. This attitude was one of Jack Gibbon's many positive qualities. He firmly thought that everyone should try to contribute to what was best for humanity; who the individual was that first arrived at a satisfactory solution of a problem was of minor importance. The main thing was that methods be developed and put into operation as soon as possible in order to relieve human beings from suffering and to restore them to as normal a function as possible, in this case by surgical correction of intra-cardiac malformations or dysfunctions. This way of thinking and acting was characteristic of Jack Gibbon. I believe that, when after working for more than two decades on the development and construction of a heart-lung machine, Jack Gibbon successfully used it on a human patient, everyone who knew him sincerely felt not only that he should be the first to achieve this distinction, but also that he richly deserved it. It made both me and every man in my group very happy when we received Jack's letter of May 21, 1953, telling that he had successfully performed an intracardiac operation with his machine with excellent results. The patient had been connected with the apparatus for 45 minutes and was on total extracorporeal circulation for 26 minutes. I am quite certain that there was no feeling of envy in anyone and that all his contemporary colleagues were very glad when the news of this great event in the history of cardiac surgery spread throughout the medical scientific community.

As you may know, during the following years, Jack Gibbon had his hands full in order to reorganize the surgical division of the Jefferson Medical School, which I think prevented him from devoting himself as entirely as perhaps he may have wished to further developments within the field of open heart surgery.

His vision in reorganization earned him the honor to be appointed the Samuel D. Gross Professor of Surgery and Head of the Department of Surgery at the Jefferson Medical College and Hospital in 1956. He knew that his friends at the Mayo Clinic, with John Kirklin as head of the cardio-vascular group, had better means and possibilities to continue the development of his apparatus and to demonstrate its tremendous value by utilizing it in a large number of cases. Jack Gibbon therefore arranged for them to continue his work but it took another couple of years before the Mayo model of Jack Gibbon's heart-lung machine became ready for extensive use.

Meanwhile, as I have already said, back in Stockholm my associates and I had progressed to the point where during the summer of 1954, we performed the second open heart operation under total bypass. When Jack Gibbon heard about it he was among the first to congratulate us. His letter was a sincere expression of

gladness and satisfaction. Never did he express any regret that he himself did not have the time or the opportunity to use his invention in a large initial series of open heart cases. He derived great satisfaction from his work at the Jefferson Medical School where he reorganized the department of surgery in the way he considered best and made it possible to train medical students according to his principles.

As I come to the end of this speech, I would like to tell you that I was in Switzerland when Dr. Sturgis telephoned in order to invite me to participate in the celebration of the twentieth anniversary of the first successful open heart operation performed by Jack Gibbon. I was extremely happy to be able to be present at this event with my friends, Jack and Maly, and I immediately accepted, of course.

When I returned home to Stockholm, a letter from Jack's family was waiting for me. When I opened it, I was shocked to learn that he had died suddenly.

From a purely emotional point of view, I nearly sent a telegram to Dr. Sturgis saying that I did not believe I could bear to participate under these circumstances. I also immediately telephoned Maly to tell her about my family's feelings and my own sadness. While speaking to her, I changed my mind and decided to come to Philadelphia after all.

I have always had the greatest difficulty in expressing myself when deeply and emotionally upset; therefore, I must ask you to bear with me and accept my apologies for my inability to give you the true picture of Jack, a man that I admired and loved for so long.

To me he stands out as one of the great figures of our time who eminently deserved the many honors and distinctions bestowed upon him during the latter part of his life. I have strongly supported his nomination as Nobel Prize winner, but as perhaps you know, the Prize is very seldom awarded in recognition for work performed in the fields of clinical medicine or surgery.

I will always remember Jack Gibbon as one of the noblest, most consistently straight forward, honest and loyal friends I have known. I will never cease to admire his intelligence, his spirit of discovery, his great working capacity and the quality of his leadership.

His dedication to humanity and deep feelings for his family were parts of him that bound him closely to my family and myself. I will never forget him and I call on you here tonight to honor him in your hearts and memory.

Clarence Crafoord, M.D.

My meeting with John Heysham Gibbon was an outgrowth of a proposal made to me by Owen H. Wangensteen and Maurice B. Visscher in January 1946, that I organize an effort to develop a pump-oxygenator to permit repair of intracardiac defects under direct vision. In seeking suggestions, it was my good fortune to have a conference on February 6, 1946, with Dr. Edward D. Churchill in his office at Massachusetts General Hospital and to learn from him of the work in this field which Jack Gibbon had begun ten years before. Obviously I was a late comer.

I was welcomed with open arms by Dr. Gibbon, then just moved to Jefferson Medical College on his return from military service. He had not yet set up his laboratory at that time, but he expressed his delight that someone else was preparing to join in the effort. He provided me with counsel and reprints and showed me all that he had in the way of equipment and data, and we agreed then and there that our collaboration should be as complete as distance would allow. There developed one of my most cordial and cherished friendships,

one that included Mrs. Gibbon and shortly my wife as well, the Allbrittens, and many more.

We had numerous visits between Jefferson and Minnesota, and later Downstate, and presented our material consecutively before the American Surgical Association in April, 1951. Mrs. Gibbon was a co-author with her husband. At that meeting it was the good fortune of the Minnesota group to be able to present a clinical operation with the machine we had built. Circulatory support was gratifying, but the atrio-ventricular canal found in fact was a rude surprise when an atrial secundum defect had been expected, an episode which served to spur rapid development of the cardiac diagnostic laboratory there.

The laurels properly go to the man who succeeds, and John Gibbon's success with his machine in 1953, two years before our group in Brooklyn, was an advance of vast importance and a fitting climax to a career of patient development begun nineteen years before. Perhaps it was more than coincidence that this milestone was reported the following year in Minnesota Medicine.

We shared one misfortune in that inquiries from the Smithsonian Institution concerning availability found both machines no longer in existence.

Jack Gibbon's vision and tenacity, far beyond brilliant development of a device and technique, pioneered a whole new era in the role of medicine in cardiovascular and pulmonary disease, catalyzing explosions in physiologic and pathologic understanding, diagnostic procedures, surgical therapy, and, most of all, concepts. The meaning in terms of humanity can be punctuated by the 50,000 yearly open-heart operations being performed in this country; among the pediatric group in this number, the projected healthy salvage is more than one-half million patient-years for 1972 alone.

The broadening of frontiers secondary to John Gibbon's dream is typified by the embarkation of Kusserow and of Kolff and Akutsu in 1957 upon the development of an artificial heart. They were shortly joined by many more, among them Dr. Frank Hastings, who later, in 1965, was placed in charge of the Artificial Heart Program of the National Heart Institute, which he directed so effectively until his death two years ago. In assuming the Directorship of the Division of Technological Applications (which includes the artificial heart program), it is my hope that I can contribute in some small way to the continuation of the Gibbon dream.

On an occasion such as this, it is difficult to dissociate one's emotional from one's intellectual responses. In thinking of the Gibbons, recollections arise such as of a welcoming party at the Allbrittens' with the Gibbons the day Willem Kolff and his children arrived as immigrants; of Christmas morning in the Gibbon living room with them, Leo Eloesser, and Frank Allbritten the year we moved east; of times at the Gibbon farm with them, Clarence Crafoord, Charles Wells, the Allbrittens, the Tom Nealons, and more; and of trips such as our group trip to Russia two years ago. These were truly wonderful times.

We honor today a man and his wife who have enriched our hearts as well as our minds.

Clarence Dennis, M.D.

How can I say what Jack Gibbon meant to me when he meant so very much?

He was an inspiration to me as he was to others because of the meaningful innovative contributions he made to the progress of medicine and I am thoroughly persuaded that the most significant of them, the development and first successful clinical application of the

heart-lung machine, will forever remain one of the true milestones in medicine. Rarely, if ever, has one single research effort expanded so much the capacity of surgeons to be of help to the congenitally malformed and those disabled by adquired disease.

I think of him as a professor who used his great name and his position not for personal enrichment but as an opportunity to develop the department into an intimate effective teaching group, providing the best of patient care and maintaining an overall flavor of original investigation, one that attracted able young men from here and abroad. He always recognized the fact that research was not only important for potentially contributing new knowledge, but also for providing the ideal atmosphere in which students and young surgeons might mature. The bright young surgeons of this country never had a better friend. He delighted in discovering them and helping them move ahead.

I think of him as a soldier who made the long journey home from the Southwest Pacific on a stretcher uncomplaining, and I treasure the days we had together at the Mayo General Hospital, living near one another and working intimately in that institution, he as Chief of the Surgical Service and I as head of the Vascular Center.

I think of him as a sympathetic, understanding father and as an adoring husband who always wanted Maly, his wife, to occupy the center spot, who was very proud of her early collaboration in the embryonic heart-lung project, whose relationship with her obviously reflected the admiration, real companionship and deep love he felt for her.

I think of him as a genial host. I see him surrounded by intimate and devoted friends at the cocktail hour and dinner, on the tennis court, by the pool, at sheep-dipping time, in long stimulating conversations, always warm and intimate.

I think of him as a friend, the best friend one could ever wish for.

I think of him as a person, with his boyish red face and twinkling, vibrant eyes which forever seemed to register a bit of amazement that he should be surrounded by so much that was good, that he had been able to accomplish so much, that so many nice honors had come his way.

I think of him as a liberal, feeling person who concerned himself deeply with causes and movements he felt were just. I see him as a man who despite the seriousness of his work or play seemed to bubble over with the excitement that characterized the young at heart.

Some men are crushed by the mantle of greatness. Some find it so heavy they must stand tall, erect, arrogant. Jack wore his with easy grace, with no undue pride, but rather with pleasant, somewhat surprised satisfaction.

He will always be missed, and remembered not with sorrow but with joy.

Harris B. Shumacker, Jr.

Presentation of the Charles Hopkinson Portrait of John H. Gibbon, Jr., M.D.

Madame President of the College of Physicians of Philadelphia; Dr. Herbut, President of Jefferson Medical College of Thomas Jefferson University; and distinguished guests:

This occasion is one which Jack and I had thought about together and to which we were both looking forward. The idea was definitely approved by him although he said, with his characteristic

modesty, that he "shouldn't really have very much to do with it."

Both he and I had planned to present a portrait of him as past president of the College, as is the time-honored custom, and it seemed appropriate to us both that that portrait should be the one which I had owned for some time, painted by my father and given to me by him.

It gives me great pleasure to present this portrait to The College of Physicians of Philadelphia; but before I do so, I would like to say a few words about it. In cleaning it up for this occasion, I found the date on which it had been painted and, remarkably enough, the date is 1953! I remember well that it was painted in the spring of the year so that it represents a very good likeness of Jack as he looked at the time of the first successful open heart operation performed by him with the heart-lung machine. That spring Jack was 49 years old and my father was 83. They were old friends and mutually admiring companions.

I think that is why, as you will see, Jack is sitting so thoroughly relaxed and, undoubtedly, they were talking about the arts of medicine and painting.

Madame President, I now and forthwith present this portrait to The College of Physicians of Philadelphia.

Mrs. John H. Gibbon, Jr.

Memoir of John Heysham Gibbon, Jr. 1903–73

By JONATHAN E. RHOADS, M.D.

On February 5, 1973, The College of Physicians of Philadelphia lost one of its most distinguished former presidents, Dr. John H. Gibbon, Jr., who died of a heart attack at the age of 69 while playing his favorite sport, tennis.

Dr. Gibbon served this College in many capacities. He was a member of the Library Committee, S. Weir Mitchell Oration Prize Committee, Committee for Mary Scott Newbold Lecture, Committee for Scientific Business, and chairman of the Commission on Public Health, Preventive Medicine and Public Relations, as well as of the Committee on Nominations. He served as Elective Councillor from 1954 through 1956 and as a member of Council during that period, and again from 1958 to 1973. He was elected vice president in 1961, serving in this capacity for three years when he was elected president of the College, serving from 1964 through 1966.

During his term as president, Dr. Gibbon was instrumental in organizing a memorable entertainment for Fellows of the College at the Philadelphia Museum of Art. This was but one of many things which he did to increase the solidarity of our membership and to augment the support for the College. During all of the years succeeding his presidency, Dr. Gibbon remained devoted to the interest of the College and continued active in fund-raising and as a member of the S. Weir Mitchell Associates.

Many of the older fellows will recall that his father, John H. Gibbon, was also active in the affairs of the College and served as its president from 1928 to 1931.

Few American physicians have had a wider impact on medical and surgical practice than Dr. Gibbon, who is widely known for the development of the artificial heart-lung apparatus which in turn has permitted the development of open heart surgery, including coronary artery bypass as well as the several attempts at heart transplant. Dr. Gibbon began his work on an artificial heart-lung apparatus while a research fellow with Dr. Edward Churchill in Boston in 1934-35. Two years earlier he had witnessed the sudden death of a patient with pulmonary embolism and conceived that a mechanical apparatus might be possible which would maintain the circulation temporarily. The apparatus which he developed with the assistance of his wife in Boston in 1934-35 achieved successful acute experiments in animals. He returned to Philadelphia, where he took up his clinical work at the Pennsylvania Hospital with Dr. John Flick and his research work at the University of Pennsylvania in the Harrison Department of Surgical Research when Dr. I. S. Ravdin was director. A second model of the heart-lung apparatus was designed and built and this permitted the successful completion of chronic experiments in cats. Certain of these animals survived periods of 25 minutes or so without the use of their own hearts or lungs and survived indefinitely thereafter. Control experiments showed that no cat lived after 8 minutes of interruption of the

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

This oil portrait of John Heysham Gibbon, Jr., painted by his father-in-law, Charles Hopkinson, was presented to The College of Physicians by Mrs. Gibbon on May 5, 1973.

circulation without the machine and none recovered with intact nervous systems with interruption of the circulation longer than 3 minutes.

In the post-war years, Dr. Gibbon interested Mr. T. J. Watson of the International Business Machines Company in his project and with the additional resources made available in engineering talent, a large machine was built sufficient to carry the circulation of an adult human being. After the most painstaking control experiments, Dr. Gibbon reduced the mortality in canine operations from 80% to 8%. Only then did he apply the method to patients. He carried out the first successful open heart operation in the world using the heart-lung machine, for a patient in May of 1953, when a young woman with an interatrial septal defect was put on the machine at Jefferson Medical College Hospital, her heart opened, the septal defect closed, and her heart wall again sutured. The patient recovered and is alive and well today, and in the succeeding 20 years the world has seen the full development of cardiac surgery, including the replacement of defective valves, the correction of many congenital defects, only a few of which could be ameliorated by closed heart methods, cardiac transplantation and most recently coronary artery bypass grafts. These developments have taken place not only in the United States but all over the world. Thus, Dr. Gibbon's writings are prized in Hanoi as well as in Hong Kong, Honolulu and Hamburg.

Dr. Gibbon was born in Philadelphia on September 29, 1903. His father, Dr. John Heysham Gibbon, was also a professor of surgery at Jefferson Medical College and surgeon to the Pennsylvania Hospital. The younger Dr. Gibbon was graduated from Princeton at the age of 19 before going on to Medical College at Jefferson, where he earned his M.D. in 1927, at the age of 23. In 1931 he married Mary Hopkinson, a great-niece of President Charles Eliot of Harvard, and the daughter of an eminent artist, Charles Hopkinson, whose field of professional interest became Jack Gibbon's greatest hobby and finally his principal occupation after he retired from medicine.

After serving in the Army in World War II with the Pennsylvania Hospital Unit in the South Pacific and a subsequent tour of duty as chief of the surgical services at the Mayo General Hospital in Galesburg, Illinois, from 1942 to 1945, Dr. Gibbon returned briefly to the Pennsylvania Hospital and the University of Pennsylvania; however in 1946 he was appointed professor of surgery and director of surgical research at Jefferson Medical College, serving in that capacity for ten years, when he became the Samuel D. Gross Professor of Surgery and chairman of the Department of Surgery at Jefferson, in which position he served an additional 11 years, becoming professor emeritus in 1967.

He received many notable awards in recognition of his work and his qualities of leadership. Among these were the presidency of the Laennec Society, the presidency of the Society of Vascular Surgery, the presidency of the American Association for Thoracic Surgery, the presidency of the Society of Clinical Surgery, the presidency of the Philadelphia Academy of Surgery and the presidency of the Heart Association of Southeastern Pennsylvania. In 1954 he was elected president of the American Surgical Association, the oldest national surgical organization of the United States, founded by his predecessor, Dr. Samuel D. Gross.

Dr. Gibbon received honorary degrees as Doctor of Science from Dickinson College, from Princeton University, from the University of Buffalo, from the University of Pennsylvania, from Duke University, and an LL.D. from Thomas

Jefferson University. He became an Honorary Fellow of the Royal College of Surgeons of England and received a large number of medals and awards, notable among which were the Strittmatter Award of the Philadelphia County Medical Society in 1963, The Distinguished Service Award of the International Society of Surgery in 1959, The Roswell Park Medal in 1966, The Albert Lasker Award in Medical Science in 1968 and the third Annual Dickson Prize in Medicine from the University of Pittsburgh School of Medicine in 1972. In 1964 he received the Philadelphia Award established by the late Edward Bok.

Dr. Gibbon played a role in many civic activities, including long-time service on the Hospital Survey Committee. He was an active member of the American College of Surgeons and of numerous medical organizations. He was instrumental in teaching two generations of medical students and of training a remarkable group of American surgeons, many of whom are active at Thomas Jefferson University and other hospitals in the Philadelphia area. Still others have gone to posts in other cities, such as Dr. Frank Allbritten who became professor and chairman of the Department of Surgery at the University of Kansas, and Dr. Walter Ballinger who is presently Bixby Professor of Surgery and chairman of the Department at Washington University, St. Louis, the chair formerly held by Evarts Graham and Carl Moyer. Dr. Gibbon was for more than a decade chairman of the Editorial Board of the *Annals of Surgery* and continued on its Editorial and Advisory Board until the time of his death. He was the author of *Surgery of the Chest* and contributed chapters to many books, as well as many scientific publications in journals.

Thus, John H. Gibbon, Jr., carried forward the notable line of surgical giants who have been identified with Jefferson Medical College, including, among others, Samuel D. Gross and W. W. Keen, whose multi-volume treatise on surgery was the standard of his day. Like his father, Dr. Gibbon cut off his medical career sharply on his retirement in 1967 in his early sixties. He devoted himself to art during the years of his retirement and to family interests. He is survived by his wife, Mary H. Gibbon, and four children; Mrs. Mary Clarke, Mrs. Alice Saltzman, John, and Mrs. Marjorie Shepard, and twelve grandchildren. The third John Gibbon is a mathematical psychologist who received his doctorate from Columbia University and serves as senior research scientist at New York State Psychiatric Institute and as lecturer in the Graduate Faculty of Columbia University. His son, the fourth John Gibbon, was born last March.

Jack Gibbon was incisive in speech, in thought, and in action. He was never obscure and always forthright. His clarity of thought undoubtedly made possible his notable contributions to the medical profession. His tenacity of purpose and his insistence that his apparatus be tested as thoroughly as possible in animals before it was applied to man is underscored by the long period which he devoted to its development extending throughout almost two decades. He was an outstanding host and a wonderful friend. Above all, he stood for integrity in medical care, in medical education and in medical science. These things he taught, more by what he was than by what he said.

Mental Disease in Paulus Aegineta's *Epitome*[1]

By WILLIAM D. SHARPE, M.D.[2]

Paul of Aegina was born about 625 and died about 690. He studied at Alexandria before the Arabs burned its library, probably he practiced there, and, among the last of the epitomizing Greek eclectic physicians, he represents the end of a noble tradition. Only Theophilus Protospatharius follows him as a medical writer of any calibre, and soon after Paul's death Greek medical writing goes into eclipse.

Paul did not claim to be original or creative. Judging by the internal evidence of his writings, he was a very able obstetrician, gynecologist and pediatrician, and seems to have been a skilled operating surgeon and lithotomist. An astute diagnostician, he paid particular attention to localizing cerebral injuries by their symptoms, while his approach to fractures and dislocations is sensible and accurate. His instructions for tonsillectomy, simple mastectomy and ophthalmic surgery are concise and practical, and his discussion of the various pediatric problems, from phimosis to convulsions, which bring distracted parents with their children to physicians, reflects an intelligent, observant and kindly all-round physician.

Paul wrote an *Epitome* of medicine. Why, we do not know. He seems to have had a good practice, and neither grant review nor tenure committees existed at that time. Perhaps he was unhappily married and spent the evenings in his study; someone may have given him a supply of papyrus in lieu of a fee; or, like Aulus Gellius, he may have enjoyed reading and writing as an avocation. Possibly he taught, but the Preface to his *Epitome* states that he wrote because physicians of his time simply would not read prolix ancient writers—and Galen or Oribasius were nothing if not prolix—so that, following the example of legal handbooks, he prepared a systematic digest of material available to him. This *Epitome* survives, although incompletely. It influenced the Arab Albucasis and was a textbook of surgery at the medieval University of Paris. The *editiones principes* were published by the Aldine Press at Venice in 1528 and again in 1553, and a brilliant translation with a long commentary by Francis Adams of Banchory was published by the Sydenham Society of London between 1844 and 1847. Sir Clifford Allbutt, commenting on Paul's influence, noted (1): "His works had a great run from the seventh century down to the Middle Ages."

Assessment of sources used by an ancient writer is precarious. We know little about most ancient writers and source documentation is a recent convention. Quite a few ancient authors even retain the first person singular when they quote borrowed material! Much interpolation, interspersed comment, revision and correction took place in the digested and abstracted texts of original writers, partly because Galen's physiological theories, primitive atomism and new pragmatic observations had to be integrated with Hippocratic teachings about elements and humors to keep

[1] Read before the Classical Club of Philadelphia, March 9, 1973.

[2] Director of Laboratories, Columbus Hospital, 227 East 19 Street, New York, New York 10003; Clinical Associate Professor of Pathology, New Jersey Medical School.

current. A common pool of material and information always exists to which anyone has access. That very little of this material was original with its writer, that most of it was derivative and that a great deal of it was nonsense need surprise no reader of journals. Yet a continuing tradition of medical abstracting and digesting went on, and Table I may illustrate some of the main currents in this process.

Why should we be interested in Paul's views of mental diseases and their treatment? Exactly because Paul was a busy practitioner who claimed no particular eminence in their diagnosis and treatment. Like most nonpsychiatrist physicians, Paul probably avoided psychiatric patients whenever he could and learned no more about them than he really had to know. One gets a more accurate view of the state of medical knowledge and practice at any given time and place not from the front runners but from the plodders, and in terms of the care which sick people nowadays actually get, what the Harvard professor knows, thinks and does is vastly less important than what Dr. Smith, of Gravel Switch, Kentucky, knows, thinks and does.

INTRODUCTION

Postclassical Greco-Roman physicians generally regarded any excess or defect among the four humors (phlegmatic, melancholic, choleric, sanguine) as at least a potential cause of disease. The particular disease which developed would, however, be a function of the humors involved, the parts of the body affected, the time and seasons of the

TABLE I
Paul's Historical Milieu

Anno Domini	Major World Events	Major Medical Writers
14–17	Tiberius	Celsus
45		Scribonius Largus
50		Athenaeus of Attila
54–68	Nero	Dioscorides
98–117	Trajan	Rufus of Ephesus
117–138	Hadrian	Aretaeus the Cappadocian
		Soranus of Ephesus
131–201		GALEN
		Antyllus
		Mnesitheus
		Aeschrion
		Archigenes
		Leonides
		Herodotus
		Philumenus
335–403		ORIBASIUS
335	Constantine closes the pagan temples	
480–544	St. Benedict of Nursia	
490–575	Cassiodorus Senator	
525–605		Alexander of Tralles
527–565	Justinian I	Aëtius of Amida
528	Monte Cassino founded	
622	Mohammed's hegira	
625–690		PAUL OF AEGINA

year, the geographic area, prevailing winds and the patient's basic premorbid personality and temperament. Most mental disease was grouped under the general heading of *melancholia:* Hippocratic writings generally grouped *melancholia* and *mania* together, and Galen's analysis was typical: melancholia is caused by an excess of black bile which acts upon the rational faculty. Neither the Hippocratic nor the Galenic schools were very precise as to how these humors worked. Somewhat later, Soranus and Caelius Aurelianus, apparently thinking that minute solid particles (*atoms*) moved throughout the body, developed an elaborate scheme of constrictions and relaxations to be accomplished by opposing therapeutic forces. Ancient physicians and educated laymen, down to the time of Paul and long thereafter, regarded mental disease, like other diseases, as natural events. They did not take demonic possession or divine intervention seriously, nor had such theories been taken seriously since at least the time of the Hippocratic corpus. Edelstein (2) sums up their position:

> These considerations in themselves suggest that a belief according to which diseases are caused by demons cannot have had great bearing on Greek medicine. As a matter of fact there is, throughout antiquity, hardly one physician who accepts such a theory . . . . And even in the seventh century A.D. physicians, it seems to me, no less than laymen, are convinced of the natural character of mental illnesses although at that time the demonological explanation is more and more emphasized . . . . One is justified, then, in saying not only that the Greek physicians rejected the explanation by demonology but also that they did not take it seriously, that they treated the subject as negligible.

Late Greco-Roman medical writers generally distinguish between *phrenitis* and *delirium*, and associate the latter with severe febrile illness, most often perhaps with cerebral malaria or paludal infections. They usually termed mental disease among men *mania* or *melancholia*, but typically ascribed female mental illness to *hysteria* which had, of course, a wide variety of manifestations. By Paul's time, a general classification had evolved: *melancholia* (of which *mania* was a subdivision) was caused by an excess of black bile which acted on the rational faculty; *hysteria*, which was caused by a "floating womb" and, according to the more perceptive, by sexual frustration, and which produced a whole spectrum of symptoms; and *phrenitis*, which was intellectual impairment caused by the *phrên*, that portion of the diaphragm where part of the intellectual faculty lodged. *Hypochondriasis*, a variety of physical complaints referred to the hypochondria, was not as a rule considered a psychological ailment in ancient times.

Because of their importance in appreciating what Paul, and other Greco-Roman physicians, are talking about, we must emphasize that the humors are qualities, *not* substances (Table II). Moreover, Galen and his followers thought that disease spread through the body in two ways: 1., by a flow of humors from the primary site to a remote organ, and 2., by the passage of the primary irritating humor through the nerves to a distant location. This latter was called *sympathetic spread*, which Siegel (3) further breaks down into five categories: nerve conduction, the usual manner whereby shock, what Galen and Greco-Roman physicians generally would have called *syncope* or *dyspnea*, develops; inhibition of nerve conduction; humoral transfer; passage of irritating humors (especially black bile) in vapor form, most important in the pathogenesis of mental disease; and direct spread from a diseased to a sound organ.

Ancient, like modern, physicians thought that disease was a departure

TABLE II
Composition of the Humors and Elements from Qualities*

Primary Qualities	Element	Humor	Temperament
Hot and moist	Air	Blood	Sanguine
Moist and cold	Water	Phlegm	Phlegmatic
Cold and dry	Earth	Black bile	Melancholic
Dry and hot	Fire	Yellow bile	Choleric

* After Siegel, 1968, p. 218.

from the normal and, looking upon mental disease as every bit as much the result of natural causes as physical disease, define normal (4):

> That man is in the best temperament of body when it is in a medium between all extremes, of leanness and obesity, of softness and hardness, of heat and cold, of moisture and dryness; and, in a word, who has all the natural and vital energies in a faultless state.

Temperament here refers to the *temperies*, the *krasis*, the harmonious balance and adjustment among the various humors: not too much, not too little. Any departure from this balance might lead to disease, and it was up to the physician to restore this *krasis* using any means at his disposal.

SEX AS A NATURAL FUNCTION

Paul has a Greco-Roman attitude toward sexual activity which must be noted at the outset. This is essentially masculine, although one suspects that Greco-Roman physicians and laymen would have been as confused by liberated women who expatiate at length and in public about their right to frequent orgasms of high quality as puzzled by traditional Christian esteem for sexual abstinence and virginity—they would likely have considered the former licentious, but the latter foolish. Paul's attitude is typical of his time (5):

> From sexual enjoyments, the following advantages may be derived: they relieve plethora, render the body lighter, promote its growth, and make it more masculine; they free the mind from the cares which beset it, and relieve it from ungovernable anger. Wherefore the best possible remedy for melancholy is coition. Those also who are otherwise affected with mania it will restore to reason. It is also a powerful remedy for phlegmatic disorders, will restore the appetite to those who have lost it, and dispel continued libidinous dreams. The temperaments which are most adapted for venery are the hot and humid, and these bear it best. A dry and cooling diet, old age, and the season of autumn unfit for it.

Paul's analysis of sexual activity is eminently normal: pleasant and relaxing but, unlike modern literary views, neither ecstatic nor orgiastic. One feels Paul's sanity, and suspects that much modern literary erotica is composed by the impotent, the deviant and the perpetual onlooker. Libidinous dreams were regarded as abnormal and, in a free-wheeling society, would have been unusual.

SLEEP DISTURBANCES

Paul recognized that sleep disturbances accompany febrile illnesses, and describes them fully in connection with fevers, but he also appreciated that insomnia or reversal of sleep patterns when not associated with fever is not only a distressing but may be a very serious sign of psychiatric illness which can feed on itself and lead to devastating consequences (6):

> The cure of watchfulness in disease, whether proceeding from pain, fever, or some acute

symptom, will be treated of under the head of Fevers. But we shall now treat of the watchfulness of those in health. If their watchfulness proceed from sorrow, care, or any mental emotions, we must endeavour if possible to remove the offending cause, and then to divert the attention by agreeable sounds. For this purpose, some seek after the gentle noise of waters, by which they are soothed and lulled to rest. After proper digestion, they should use baths, especially in the evening, and a moistening diet, such as lettuces and the like. They may also mix the green leaves of the black poppy with condiments, and eat fish of easy digestion. They should also use plenty of wine which is light and not old. When about to go to bed, their heads should be anointed with rose oil, or with oil in which the heads of poppies or mandrake have been boiled. And the oil of dill not too old is soporific. I have known rest succeeding suddenly to fatigue [to] produce this effect. Moderate coition will sometimes do the same. Others easily procure rest by having their head and feet cooled. But if their watchfulness be occasioned by their stomachs being oppressed by the quantity or bad quality of the food (and I have known this to happen, in like manner as in others it arises from an unseasonable abstinence or diminution of their accustomed food), this ought to be inquired into and the cause removed.

His differential diagnosis thus includes worry, mourning and mental unrest of any cause, hunger and overeating. He recommends a sensible regimen involving drugs, psychological reassurance and what one now would call physiotherapy but which the ancients would have termed *dietetics.* If the cause can be removed, this is to be done, and the patient's attention is to be diverted. Agreeable sounds, including that of flowing water, may be helpful. He recommends a light diet, oil massages, cooling the patient and hydrotherapy—modalities still useful in psychological disease. Mild sedation is advised: light wines, lettuce and the green leaves of the poppy. Alcohol and mild, naturally occurring drugs may provide some relaxation. In certain cases, getting the patient extremely tired may help, and moderate coition may aid others.

Paul distinguishes insomnia complicating acute febrile diseases from that of psychological origin (7):

Those who are much troubled with insomnolency, we are to direct to have their legs and hands bound with ligatures at the time when they were accustomed to go to rest; and make them keep their eyelids open, or wink, until they are sufficiently fatigued; then we suddenly loosen the ligatures, remove the lamp, and order complete stillness to be preserved. But, when the insomnolency is obstinate, we must bathe the forehead during the decline of the paroxysm with the decoction of the heads of the black poppy, and direct the patient to snuff up the dried and powdered husk of the white poppy; or from the root of the mandragora pounded with wine and rose oil in equal quantities, we make an emollient ointment (malagma), and smear the forehead with it. . . . Or, taking the pounded heads of poppies, we make a cataplasm of it with bread and rose oil, or cerate. And the greatest attention ought to be paid to the food. Let about three spoonfuls of the seeds of the white poppy be added to the patient's gruels; and let his pot-herbs be prepared by adding to them as many of the leaves of the black poppy, if green, as can be contained within three fingers; or otherwise, three or four dried heads may be boiled with them and taken. If, even by these means, sleep cannot be procured, let him be smeared with the juice of poppy or of mandragora. But the electuary composed from the heads of poppies, and, particularly that which is drunk with sodden wine, to the amount of a spoonful, or a spoonful and a half, often disposes to sleep. Those who are not troubled with fulness of the head may use the following fumigations in the decline: Of Indian leaf, of amomum, of costus, of amabo, of each ʒ j, of the fruit of the balsam tree lb. j, of storax, of ammoniac perfume, of Scythian bdellium, of the root of the mandragora, and juice of poppy, as much; use as a fumigation with cypress-wood.

Insomnia is here recognized as a complication of another, usually febrile, process. Paul recommends that fatigue be induced and suddenly released; if that fails, he advises massage. Drugs are used should less drastic methods fail—insufflation of opium across the nasal mucosa; mandrake (with its hyoscine-like action)

by inunction; and, if others fail, opium administered in the patient's food. The mixture of poppy heads and wine amounted to a dilute tincture of opium, and the Indian leaf was a form of *cannabis indica* or of marijuana.

Discussions of medieval hagiography often dwell with dry pedantic salacity upon *incubi* who came to torment the saints by night. Such *incubi* were, in fact, recognized medical entities, and Paul has this to say (8):

> . . . . It attacks persons after a surfeit, and who are labouring under protracted indigestion. Persons suffering an attack experience incapability of motion, a torpid sensation in their sleep, a sense of suffocation, and oppression, as if from one pressing them down, with inability to cry out, or they utter inarticulate sounds. Some imagine often that they even hear the person who is going to press them down, that he offers lustful violence to them, but flies when they attempt to grasp him with their fingers. The evil must be guarded against at the commencement; for when it continues long, and attacks every night, it is the forerunner of some serious diseases, such as apoplexy, mania, or epilepsy, when the exciting cause if determined to the head; for such as persons affected with epilepsy are, during the day, those labouring under nightmare are in their sleep . . . .

Incubi were, therefore, a form of nightmare well-known to ancient physicians, and were not inventions of frustrated medieval religious so much as a part of their cultural ambience. The description of nightmare is accurate, and the fright experienced by the dreamer is well defined.

MELANCHOLIA AND MANIA

Paul follows traditional ancient classifications of mental disease (9):

> Melancholy is a disorder of the intellect without fever, occasioned mostly by a melancholic humor seizing the understanding; sometimes the brain being primarily affected, and sometimes it being altered by sympathy with the rest of the body . . . . The common symptoms of them all are fear, despondency, and misanthropy; and that they fancy themselves to be, some, brute animals, and imitate their cries; and others, earthen-vessels, and are frightened lest they be broken. Some desire death, and others are afraid of dying; some laugh constantly, and others weep; and some believe themselves impelled by higher powers, and foretell what is to come, as if under divine influence; and these are, therefore, properly called demoniacs, or possessed persons. The peculiar symptoms of melancholy, from sympathy with the general system, are leanness, darkness and shagginess; the whole appearance melancholic, either by nature, or acquired by anxiety, want of sleep, the administration of noxious food, or stoppage of the hemorrhoidal, or menstrual discharge.

Rarely has a physician said so much in so few words. Paul notes that melancholy is an intellectual aberration unexplained by acute organic illness. He skips lightly over theories as to etiology, but emphasizes such common symptoms as fear, depression, delusional systems and gross disturbances of mood and affect. He singles out those with delusions of divine guidance, most of whom were probably paranoid schizophrenics, as demoniacs or possessed, and he comments on the lean, wild, hairy look of many disturbed patients. Whatever their cause, Paul clearly identifies the major signs of serious mental disorder—delusions, mood swings, paranoid ideation and psychological withdrawal.

Paul outlines his treatment for melancholic patients which, during his time, usually relied on drastic purgatives, bitters and carminatives, augmented by phlebotomy, cupping and, among the more humane, the baths (10):

> . . . Those who are subject to melancholy from a primary affection of the brain are to be treated with frequent baths, and a wholesome and humid diet, together with suitable exhilaration of mind, without any other remedy, unless when, from its long continuance, the offending humour is difficult to evacuate, in which case we must have recourse to more powerful and

complicated plans of treatment . . . . When you meet with an incipient case of the complaint, from sympathy with the general system (as described above), and the body is firm, you must, by all means, begin with phlebotomy, and when the strength is recruited, purge downwards . . . . Diuretic remedies are likewise proper, as also evacuations by perspiration . . . . The diet for all melancholics should be wholesome, and moderately moistening; abstaining from . . . . whatever things engender black bile.

The compassionate feature is the phrase "without any other remedy" which follows instructions for diet, bathing and "suitable exhilaration of mind." This would have been effective, and does resemble the rest cure of days past. We cannot be sure how the bleeding and purging would have worked, but the usual phlebotomy until early in the nineteenth century was *ad deliquium*, to the point of faintness, and withdrawal of a liter of blood was not unusual. This would leave the patient somewhat subdued for a few days and if, as strength was returning, purges and sweats were initiated, the patient would be sufficiently wearied and preoccupied that he might become more receptive to a less taxing regimen.

Although, as we have noted, some ancient writers distinguished between *mania* and *melancholia*, Paul discusses them in the same part of his *Epitome* (11):

. . . When the complaint is occasioned by yellow bile, which, by too much heat, has been turned into black, it will bring on the disease called mania, which occasions ungovernable madness, so that those affected with it will destroy persons who come near them unguardedly.

His therapy is consistent (12):

Persons affected with mania are to be treated like melancholics . . . . If the manics will not be persuaded to take the purgative medicines, they must be mixed with their food, in a concealed manner, such as with mouthfuls of meat, or dried figs, or dates, or else with their drink. But, above all things, they must be secured in bed, so that they may not be able to injure themselves, or those who approach them; or swung within a wicker-basket in a small couch suspended from on high.

Violent patients, homicidal or suicidal if unguarded, exist now and existed then, whether psychotic, psychopathic or temporarily deranged. Paul doesn't really seem to have much confidence in the drugs he recommends, and falls back on restraints and attendants. The gently swinging, suspended wicker basket is a delightful touch which must have made everyone happy—one servant could keep it in motion, adjusting its speed as needed; the motion could pacify and relax a patient who, if he became disorderly, could develop motion sickness from the more rapid gyrations required to distract his attention; and the patient was confined safely, visibly and out of harm's way.

Paul describes another subdivision of melancholia whose clinical pattern no longer seems to occur, *lycaon* or *lycanthropia*. Liddell and Scott (on Paul's authority) define *lykanthrôpia* as a kind of madness in which the patient has the ravenous appetite and other qualities of a wolf, but *lykanthrôpos* is a were-wolf. Paul says (13):

Those labouring under lycanthropia go out during the night imitating wolves in all things, and lingering about sepulchres until morning. You may recognize such persons by these marks: they are pale, their vision feeble, their eyes dry, tongue very dry, and the flow of the saliva stopped; but they are thirsty, and their legs have incurable ulcerations from frequent falls. Such are the marks of the disease. You must know that lycanthropia is a species of melancholy which you may cure at the time of the attack, by opening a vein and abstracting blood to fainting, and giving the patient a diet of wholesome food.

We do not recognize this syndrome, but are not willing to dismiss it as Paul's

gullibility—Paul was no fool. Dr. Mead, according to Adams' note on this passage, thought that the demoniacs mentioned in Scripture (Luke 8:27) suffered this disease, and it may represent a reaction pattern which no longer occurs—perhaps chronic ergotism, in which disorientation seems to be accentuated as night falls. Much psychological illness is, after all, culturally determined—some would say most—but it is not difficult to appreciate that references such as Paul's contributed to the were-wolf legends.

PHRENITIS

Paul seems diffident in his discussion of *phrenitis*, which he attempts to distinguish from the *delirium* associated with high fevers and infections of the central nervous system. His discussion reflects its difficulty in diagnosis and its uncertain prognosis and course (14):

> Phrenitis is an inflammation of the membranes, the brain also being sometimes inflamed along with them, and sometimes a preternatural heat fixes originally in the brain itself. The cause of this disorder is either a fulness of blood, or of a yellow bilious humour; and sometimes the yellow bile, being excessively heated and converted into the black, becomes the cause of the worst species of phrenitis. And sometimes the affection arises from the brain's sympathizing with the diaphragm by means of the nerves distributed upon it. But the aberration of intellect which occurs at the acme of very hot fevers, and that which is occasioned by sympathy with the stomach, is not called frenzy but delirium. Cases of true phrenitis are, for the most part, attended with watchfulness, but sometimes with disturbed sleep, so that the patients start, leap up, and cry out furiously; when the complaint is occasioned by a sanguineous humor, with laughter; but when by yellow bile, with ferocity; and when by a black, with unrestrainable madness. They forget what is said and done by them . . . . they pick at flocks of wool and gather bits of straw, and have acute fever during the whole continuance of the disorder. When a fever of a bad character is seated deeply, they have the pulse small and indistinct, with a certain degree of hardness. The respiration is large and rare when the brain is primarily affected. And, if the phrenitis be occasioned by sympathy with the diaphragm, the respiration is irregular, the hypochondria are retracted and have considerable heat; but, when it arises from sympathy with the brain itself, the parts about the face are hot and suffused with blood, and the veins are full. When a pituitous humor is mixed with the bilious, as the cause of the disease is compound, so also is its appellation; for it is called coma vigil. When a bilious humour prevails, persons so affected are troubled with watchfulness; and, when a pituitous is the cause, they lie in a state of coma. The elder writers before Galen called this disease catochus, but since then it has been catoche and catalepsy.

This nosologic explanation of intellectual disorientation is founded on the humoral pathology accepted in Paul's time. Frenzy is distinguished from the delirium of high fevers, but *phrenitis* remains a loosely defined entity characterized by disturbed sleep, insomnia, starting, irrational cries and violent motions. Paul lists what he takes to be the results of specific humoral excess, and these are summarized in Table III. This distribution agrees with the humoral etiologies assigned to other forms of mental disease. By our standards, Paul is incorrect, but by the standards of the time, his explanation of his observations and data is coherent. The medical historian, Fielding H. Garrison, notes (15):

> . . . the greater physicians of the past, reasoning from what seem to us very faulty premises, somehow got their patients well, otherwise they would have had no clientèle or following. The thing is to ascertain, if possible, just how they did it.

The non-physician historian may be perplexed by this, but almost any physician, aware of just how pragmatic medicine really is, finds this unremarkable.

Thus, although his pathogenesis is incorrect, Paul's therapy of phrenitis makes sense (16):

> . . . Let the patient be laid in a place which is in

TABLE III
Specific Psychiatric Syndromes Resulting from Specific Humoral Excesses According to Paul of Aegina

Psychiatric Syndrome	Humoral Excess
Laughter	Sanguine
Ferocity	Choleric
Ungovernable madness	Melancholic
Coma vigil	Bilious and pituitous*
Insomnia	Bilious
Coma	Pituitous

* The syndrome of coma vigil required excess of *both* humors.

a moderate state as to light and temperature, and let there be no paintings in it, for these are apt to excite emotions in such cases. Let some of his beloved friends come in and converse with him in a suitable manner, sometimes gently soothing him, and at other times chiding him more harshly . . . . and the patients are to be kept in a recumbent posture, for a state of quietude is to be maintained as much as possible; and, if they be rich, they are to be restrained by their servants; but, if not, they are to be bound with ligatures . . . .

This last phrase is a delicate touch of realism—resources for medical care have always varied.

HYSTERIA

As we noted, in Greco-Roman times, most mental disease which occurred among women was grouped as *hysteria.* Paul has this to say (17):

Uterine suffocation is a rising up of the uterus, affecting sympathetically the most important parts, as the carotid arteries, the heart, and the membranes of the brain. The patients experience, when the attack is at hand, languor of mind, fear, atony of the limbs, paleness of the countenance, and madness of the eyes; and when the suffocation comes on there is deep sleep, mental aberration, loss of the senses and of speech, with contraction of the limbs; the cheeks then begin to redden, and the countenance becomes turgid; but when the attack is going off, some moisture is to be felt about the genital organs; and rumbling of wind in the intestines precedes the remission. The uterus is then gradually relaxed, and thus they recover their understanding and senses. The disease comes on periodically like epilepsy, and is occasioned by the uterus being gorged, or from semen or some other matter having become putrid in it . . . . This affection attacks most frequently in winter and autumn, especially young women who are prone to venery, the barren particularly, if their sterility be brought on by medicines, and others of a cold nature.

Hippocrates had noted, and ancient physicians generally agreed, that hysteria most frequently attacked antiquated virgins and young widows. His simple remedy was effective because it supplied exactly what was needed: get them married, and fast.

Paul's description is a masterpiece, and he tactfully touches upon the sexual underlay of most hysterical attacks. Until late in the nineteenth century, physicians generally denied the possibility of true hysteria among men, although a few writers suggested that protracted, unsatisfied sexual frustration might precipitate it among men. How the uterus produces hysterical suffocation, with convulsions, follows Galen's teachings which regarded the uterus as an animal within an animal, moving about the abdominal cavity by motion of the uterine ligaments. Thus, when the uterus pressed against the liver, it pro-

duced one set of symptoms and against the diaphragm or heart, still other symptoms. Although now rare in sophisticated North American circles, physicians still occasionally encounter almost classical Hippocratic hysterical attacks among female immigrants from Mediterranean or Caribbean lands.

Perhaps love-sick adolescents were more familiar to Paul than to some physicians. He notes (18):

> It will not be out of place here to join love to the affections of the brain, since it consists of certain cares. For care is a passion of the soul occasioned by the reason's being in a state of laborious emotion. The following symptoms attend lovers: Their eyes are hollow, and do not shed tears, but appear as if overflowing with gladness, their eyelids move rapidly . . . . There is no pulse peculiar to lovers, as some have supposed, but it is the same as that of persons labouring under care. When they call to recollection the beloved object, either from seeing or hearing, and more especially if this occurs suddenly, then the pulse undergoes a change from the disorder of the soul, and, therefore, it does not preserve its natural equability or order. Such persons, therefore, being desponding and sleepless, some physicians, mistaking their affection, have wasted them by prohibiting baths, and enjoining quietude, and a spare diet; but wiser ones, recognizing the lover, direct his attention to baths, the drinking of wine, gestation, spectacles, and amusing stories. Some must also be attacked with fear; for, while they think of nothing but love, the affection is difficult to remove. Wherefore, they ought also to be roused to emulation with regard to the objects of their peculiar interest in life; and upon the whole, their understanding should be diverted to other concerns.

Was this ever effective? Is love really a psychiatric disorder? Francis Adams permits himself an occasional personal comment in his notes to Paul's text, and of this particular passage he observes (19):

> Although Theocritus had declared that neither ointment nor powder is of any efficacy for the cure of love, several of the ancient writers on medicine have given directions for the treatment of desponding lovers.

ORGANIC BRAIN SYNDROMES

Three conditions deserve mention because they affect the mental processes, although Paul associates them with acute diseases and, therefore, seems to have regarded them as neurological rather than psychiatric diseases—loss of memory, coma vigil and lethargy. Concerning the first, he says (20):

> The loss of memory sometimes occurs by itself, and sometimes along with impairment of the reason, as an impairment of the reason sometimes happens first by itself, and is then followed by that of the memory. When both suffer, the affection called fatuity is formed. These complaints have for a cause the exciting intemperament; but, if it is humid only, it will occasion impairment of the memory and reason, torpidity, drowsiness, long and deep sleep; but if complicated with coldness, it will produce carus and lethargy. In like manner, dryness alone brings on watchfulness, but when jointed with heat, delirium and frenzy. These intemperaments are seated sometimes in the cavities of the brain, or in its vessels . . . . Whether the exciting intemperament be simple or compound may be learned from the appearance of the excretions. That the loss of memory and of reason springs from cold we readily ascertain; but whether it be accompanied with humidity or dryness, we judge of from the discharges, the habit and temperament of the patient, his mode of life, the season, and the country.

Carus, according to most ancient physicians, was an apoplexy which affected the anterior portion of the brain.

Coma was well known in ancient times, and its differential diagnosis included most of the categories with which it is still associated. Paul comments (21):

> Lethargy, which is a lesion of the rational part, has the same seat as frenzy, I mean the brain, but the matter which causes it is of an opposite nature; for it is occasioned by a humid and cold phlegm irrigating the brain. It is attended with an obscure fever, which is not very pungent, and with somnolency. The pulse is large, rare, and undulating; the respiration is very rare and weak. Lethargics are altogether disposed to

sleep; are roused with difficulty; can scarcely be made to answer questions; are forgetful and delirious; they yawn frequently, and remain sometimes with their jaws distended, as forgetting to shut their mouths; their evacuations by the belly are generally watery, but sometimes, on the contrary, the belly is dry; their urine is like that of cattle. Some have tremblings and sweatings. . . . [C]arus often supervenes upon other complaints, for it often follows paroxysms of fevers, epilepsy, and compression of the brain, as from the bone in fractures, or from the meningophylax pressing upon the anterior ventricle of the brain; whereas lethargy has a certain peculiar formation.

The treatment Paul recommends for lethargy is suitable for any coma, and his description above would suggest that this

TABLE IV
Outline of Paul's Psychiatric Diseases

Classification	Usually caused by:	To be distinguished from:
Insomnia	1] Sorrow, worry 2] Faulty diet	Onset of an acute illness
Incubi	Faulty diet	Prodromal stages of mania, apoplexy and epilepsy
Melancholia	1] Primary humoral imbalance 2] Complication of other disease	
. . . . .		
a] Mania b] Lycanthropia	Special forms of melancholia	
Phrenitis	Direct effect of abnormal humoral balance acting on the brain; symptoms depend on prevailing or predominant humor	1] Acute febrile disease 2] Delirium from high fever 3] Catalepsy and coma
Hysteria	Uterus wanders around the abdominal cavity	Phrenitis
Love-Sickness	1] Worry over love affairs 2] Absence from or preoccupation with a loved one	1] Melancholia 2] Insomnia
Loss of Memory	Related to apoplexy	Not primary psychiatric diseases
. . . . .		
Lethargy	1] Onset of certain acute febrile illnesses 2] Brain trauma 3] Epilepsy	
. . . . .		
Catochus	Febrile illnesses ending in coma	

particular form of lethargy is neither postictal nor postapoplectic, but related to central nervous system infection or injury. In the Hippocratic writings, *lethargus* is generally a remittent fever (like malaria), or a *causus.* It is here clearly not a psychiatric illness. We tend to forget just what a curse malaria was to the ancient world, and that its manifestations are as diverse as those of syphilis or tuberculosis, which mimic almost any disease.

Catochus, or coma vigil, was a specific entity which the ancients related to but distinguished from both phrenitis and lethargy. Paul describes it thus (22):

> . . . The peculiar symptoms are these: The patients remain fixedly stretched in a supine position, having sometimes their countenance somewhat swelled and livid like those in lethargy, and sometimes with a florid redness in it; the upper eyelid seems drawn upwards and projecting, so that they cannot wink. They seem also not to breathe, but to be as dead. The pulse is small, indistinct and very dense. The discharges from the bowels and bladder are suppressed, or in small quantities. When the attack is moderate, they drink whatever fluid is poured into the mouth; but those who are overpowered by it reject the same by the nose. . . . The cases are dangerous in which there is much watchfulness, the urine is suppressed, the difficulty of breathing is intense, when they have sweats, and the drink regurgitates by the nose. If it be a woman that is affected, the complaint may be distinguished from uterine suffocation by the circumstance that she lies in a natural state, is sensible when spoken to, can be roused, but sinks again into a state of sopor. Some say that catochus is a different complaint from the coma vigil, for that it has not a compound, but a simple cause; namely, a cold and dry matter which obstructs the posterior ventricles of the brain, and occasions the disease; in which case, the patient being suddenly seized with it, remains in the same position as when taken with it, that is to say, standing or lying, with his eyes open or shut. The ancients, therefore, called such patients *catochi*, which signifies *detained*, but the moderns call the complaint catoche and catalepsy. . . .

Coma vigil was typically associated with cerebral infections, and distinguished from cerebral apoplexy, which was well known. The commonest cause, again, was probably cerebral malaria. Paul's account notes, correctly, the sinister prognosis when both the corneal reflex (". . . they cannot wink") and gag reflex (". . . fluid is poured into the mouth . . . reject the same by the nose") are abolished, through paralysis of the brain stem. Quite possibly, the latter part of the description (". . . remains in the same position as when taken with it") may conceal a reference to catatonic schizophrenia, but this is only conjecture on our part. The important thing is that Paul consistently considers the possibility of organic disease whenever he approaches a patient whose behavior is bizarre or who seems mentally deranged. This is a sign of a thoughtful and experienced physician.

CONCLUSION AND SUMMARY

Paul presents a coherent description of most forms of mental disease defined in his time and discusses the principal non-psychiatric disorders with which they might be confused. His explanations of their etiology and pathogenesis are consistent with the modified eclectic humoralism of postclassical Greco-Roman medicine which dominated medical thinking until the correlation of clinical and post mortem appearances founded by Morgagni in the eighteenth century placed clinical medicine on a sound factual basis. Only one form of mental disease which he describes—*lycanthropia*—seems to have disappeared, but diseases do change and do disappear. Nowhere is there superstition or irrationality, and no demons lurk in the minds of Paul's patients, however distracted. He does not, of course, speak in terms of psychosis or neurosis, of reaction and defense. These modern concepts resulted from nineteenth century workers who applied Morgagni's method of analysis

and observation to mental disease and, by doing so, Janet, Pinel and Charcot prepared the way for Freud.

Paul's therapy was, above all, humane, rational and compassionate. Psychological counsel, rest, quiet, hydrotherapy, a proper diet, recreation, exercise, reassurance; perhaps light sedation; and only after these failed did drastic therapy—purges, sweats and bloodletting—or restraints have a place. His treatment was probably as effective as ours, and we are glad that it was so.

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7. 2.42, On watchfulness in fevers (Adams 1.299): *fever* was a generic term for acute diseases generally.
8. 3.15, On incubus, or nightmare (Adams 1.388).
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20. 3.11, On the loss of memory and of reason; on carus and fatuity (Adams 1.372).
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The Education, Career Opportunities and Status of American Women Pharmacists to 1900, Including a Directory

By ROBERT W. CULP*

By the laws of God, no less by the laws of man, the American colonial woman was inferior. Secluded and uneducated, her name appeared in print only twice during her lifetime, first among the marriage notices and once again when her death was recorded. Man, in calling woman his inferior, required sound arguments to support his position. An observer standing with the elders as they discoursed upon the topic of education for females might note their arguments. If schooled, they said, a woman's gossamer intellect would crack, her body would not withstand the strain. If indeed she did survive the ordeal of education, who would marry her? What man would tolerate an intelligent, educated woman? So prevalent were these beliefs in colonial America that eighty years after the signing of the Declaration of Independence one notes the statement (1) that "a woman must have uncommon sweetness of disposition and manners to be *forgiven* for possessing superior talents and acquirements."

Yet in time man's fears were proven groundless and his prejudices were somewhat dulled. Girls' minds were found equal to the rigors of a college curriculum, their physical stamina was judged adequate, their social achievements were attained just as readily as were those of girls of like economic and social status who did not go to college.

Although American colonial women were unschooled, it fell to them, as wives and mothers, to doctor minor ills in many communities. A few women had some knowledge of healing arts, and some practiced midwifery. In many cases the traditions handed down from mother to daughter included knowledge of drugs and herbs which were used as correctives for certain illnesses. The home remedies and the healing skills of women were given to friends and neighbors generally without recompense. The country was new and communities were remote. Neither doctors nor apothecary shops were numerous. Since money was a scarce commodity, service was paid for in kind more often than not. These circumstances, the lack of educational opportunities for women and their very modest contribution to health service, prevailed from the colonial period until the 1830s.

Women's title to equal secondary education was established when public high schools were opened at Worcester (Mass.) in 1824 and in New York and Boston in 1826. Collegiate coeducation began when Oberlin of Ohio admitted women to college classes in 1837. By the 1850s women were admitted to Elmira and to Antioch of Ohio. Hillsdale College of Michigan gave its first A.B. degree to a woman in 1850. By 1870 schools such as Mount Holyoke and Vassar had been founded to provide educational facilities exclusively for women.

The first inroads of females into the professions also occurred at this time. A degree in law was first issued to a woman

* Jacobi Library, Mount Sinai School of Medicine, Fifth Avenue and 100th Street, New York, New York 10029.

in 1870 from Union College of Law. Washington University's School of Law, opened to both sexes in 1867, graduated its first woman four years later. A degree in sacred theology was attained by a woman at Oberlin in 1851, and another entered the theological department of St. Lawrence University in 1860, but the Hartford Theological Seminary was not opened to women until 1889.

In medicine, the incorporation in 1850 of the Female Medical College in Philadelphia provided women with access to careers as physicians. By 1881 at least 470 women were known to have received medical degrees, excluding graduates of eclectic and homeopathic schools, with at least 390 of these actively engaged in the profession. Three schools offered adequate medical training solely to women by 1890, and in addition three older schools had become coeducational by that date. The number of women medical students in 1900 had swelled to more than 1400.

Along with those first faltering steps into the fields of medicine, law and theology, American women began entering the colleges of pharmacy. Their predecessors were at best schooled in the old apprentice method and at worst totally untrained. We have knowledge of an enterprising woman, a Mrs. Masters, who prepared and marketed a product in 1711 for the cure of consumption. This nostrum was called Tuscarora Rice and was produced in a New Jersey factory, providing Mrs. Masters with a lucrative income. Hurd-Mead (2) reports that Drops of Spirits of Venice Treacle were advertised for sale by a Mary Bannister in 1731, that Sarah Murray's Tar Water was available in 1748, and that Ann Tatnall's Powders were famous in 1774.

Two American women were active in retail pharmacy at the beginning of the nineteenth century. Banister (3) mentions a Mistress Jane Loring who operated a pharmacy in Boston in 1800 and is believed to be America's first woman pharmacist. The other woman was Elizabeth Marshall. The Marshall drug store, founded in Philadelphia in 1729 by her grandfather, came under Elizabeth's management in 1805. Although the store was insolvent at this time, the business flourished under Elizabeth's supervision. Beringer (4) reports, "Probably she was the first woman in Philadelphia to embark upon a commercial career upon such an extensive scale, and she was the first American woman pharmacist of whom we have any knowledge. She continued to manage this business until 1825 . . ."

It would be unwarranted to assume that American women made any serious inroads into the field of pharmacy during the early 1800s. Wallace (5) mentions that reports taking note of women in the field of drug retailing appeared in 1870. In the Consensus Report for that year, under the heading "Traders and dealers in drugs and medicines", there were 17,335 men but only 34 women. Wallace suggests that of these thirty-four women "undoubtedly the majority . . . were unqualified drug store and hospital assistants, while some few were probably makers of salves, lotions and herbal remedies."

The conditions for work in pharmacy before 1885 demanded neither registration nor examination as prerequisites for the possession, preparation or dispensing of drugs. With the passage of the Pharmacy Law of 1885 those already in the drug business became registered. In some states these licenses were granted merely upon presentation of proof that the applicant had worked in a pharmacy for a stipulated period of time; other states required the successful passing of an examination. At this time numerous women received registry certificates. Many were issued to the daughters and

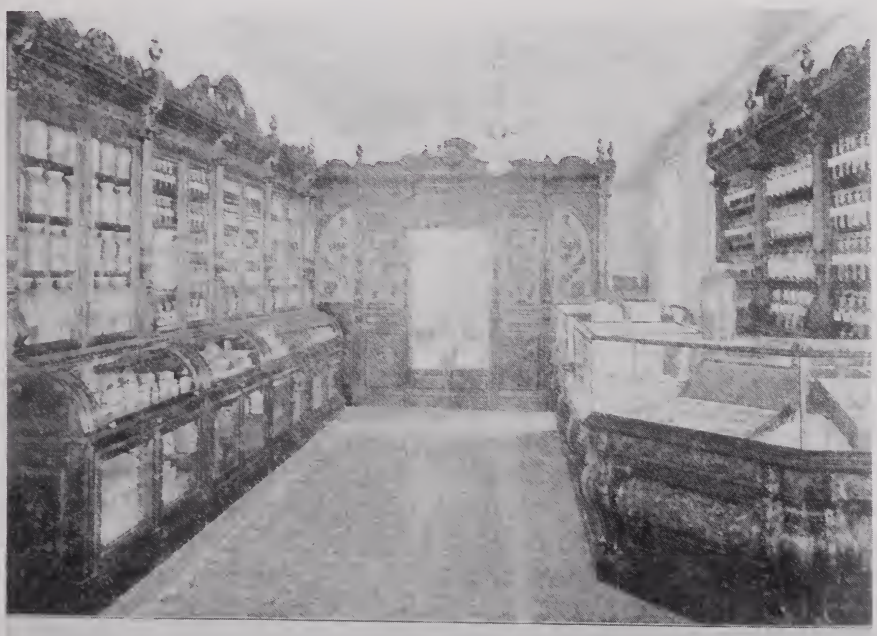
wives of active pharmacists.

One may therefore conclude from the foregoing that prior to 1880 a handful of American women had engaged in drugs and pharmacy, but that few had received either college or professional training to equip them for their work. The era of the college trained women pharmacist may now be examined.

The first American woman pharmacy graduate is generally agreed to be Mary Putnam Jacobi, who completed her studies at the New York College of Pharmacy in 1862. This remarkable woman immediately furthered her education by enrolling in the Woman's Medical College of Philadelphia, from which she was graduated two years later. Mary Jacobi then went to Paris, entered the Ecole de Médicine in 1868, and after intensive study received her degree in August 1871. She then returned to America to begin a long and distinguished medical career, and was honored as the first woman member of the New York Medical Association.

In England, Mary Jacobi's counterpart was Mrs. Garrett Anderson. Although Mrs. Anderson was denied entrance to school after school, so great was her determination to study pharmacy that by resorting to private instruction, attending lectures and pursuing long hours of solitary work she secured a license in 1865, becoming the first fully accredited woman pharmacist in England. She too went to the Ecole de Médecine and was graduated in June 1870, fourteen months before Mary Jacobi. Mrs. Anderson returned to London, opened a dispensary, and served both as a medical practitioner and as a pharmacist.

After Mary Jacobi, there was a hiatus of fifteen years in America before the next woman pharmacist was graduated; twelve years elapsed in England after Mrs. Anderson's achievement before a second British woman became an ac-



THE WOMAN'S PHARMACY.

Fig. 1. The Woman's Pharmacy.

credited pharmacist. At that time (1879) the Pharmaceutical Society of Great Britain accepted Isabel Clark as its first woman member although several years elapsed before women were enrolled in English schools for formal training. One English institution, the South London College of Chemistry noted (6) in 1884 that six ladies were studying to pass the examination of the Pharmaceutical Society and reported, "They intend to begin life as druggists, and are among the first women who have been regularly trained at public schools for this end."

A considerable number of women pharmacists trained subsequent to Mary Jacobi must remain anonymous. These women cannot be identified because of disagreements which prevailed among the historians who enumerated the pharmacy schools extant for this period. These disagreements stem from considered judgements concerning which schools (and therefore which graduates) qualified for recognition and which did not. This author (7) has shown that for the year 1873, one source listed sixteen schools, another only twelve. For the year 1887 there was no agreement among four lists which had been compiled, while for 1900 various sources listed forty-seven, fifty-eight, sixty-four or sixty-five schools flourishing to that date.

How did these data affect the number of women pharmacists reported? Were there women graduates from every school on each list of pharmacy schools compiled? Certainly not in 1875, but by the turn of the century circumstances had changed. Eighteen schools had been excluded between the highest and lowest number reported to have been operative at some time up to and including 1900. The same study has indicated that the true number of schools which met the criterion of having functioned at some time through 1900 was in fact ninety-two, broadening the difference between the lowest and highest counts to twenty-seven schools (8). It is true that women pharmacists were not in prominent numbers during the period of this study. Their male counterparts did not regard them seriously but rather looked upon them as ambitious female exceptions. Nevertheless numerous "sweet girl graduates" from the "rejected" schools must remain nameless.

One institution which contributed substantially to the number of women graduates is itself victim to the judgement of its time. In Kentucky the Louisville College of Pharmacy for Women opened in 1883 and was discontinued in 1892. There is evidence to warrant its inclusion in any list of active schools. We find in the literature the text of the address delivered at its first commencement exercises (9). Copies of announcements for the last three years of its existence (1888-92) are noted in the *Index Catalog of the Library of the Surgeon General's Office.* Yet this school has been excluded from four of five lists known to have been published for this period.

Why was this and other schools so judged? We know that at this time established standards for the quality of pharmaceutical education were nonexistent. For those contemplating a formal pharmaceutical education there was the core of old, established pharmacy schools, the newer state university departments, the association schools, the night schools, the correspondence schools, and finally a host of private (proprietary) institutions. Pharmacy educators looked upon the multiplicity of colleges with a critical eye, judging some to be more qualified than others. Thus, the names, careers and achievements of some early American women and men pharmacists have been recorded and others certainly have been overlooked.

In reporting attendance records for women in American schools of pharmacy, Taylor (10) notes that for 1891 and for 1895 through 1900 only two to four percent of total enrollment was feminine. What circumstances accounted for such small numbers?

There were at least two major areas of opposition to women pharmacists. One was a general unwillingness on the part of the public to see women occupied in *any* field of gainful work. This conservatism was widespread; a woman engaged in manual labor was not considered a lady and would lose her standing in society by becoming a wage earner. Work was honorable for men but not for women. In the South the ante-bellum concept that fathers and brothers must support the female members of the family was still prevalent. The widowed mother and two or three sisters were financially unproductive while the brother worked ceaselessly to support them. The brother could scarcely consider his own marital future so long as his sisters were unwed for he dare not add another member to his large household. For their part, his sisters had no recourse except to marriage since they could not earn independent incomes to alleviate the family financial problem.

There was in addition the pragmatic argument that it was not worthwhile to develop women's capabilities because they might marry at any time, thus negating the time, money and effort spent in their training. To this women responded by pointing out that despite their importance in domestic life they might at any time be thrown upon their own resources and be forced to support themselves and others. The position of the commercial world with its "ban on maternity" and its "penalty on love and marriage" prevented them from becoming capable, strong and efficient, and by so doing prevented them from facing life's problems independently.

The second area of contention consisted of a substantial number of arguments raised in opposition to women's participation in the field of pharmacy itself. The public was becoming accustomed to seeing girl clerks in general stores and female cashiers in business offices but women were often looked upon with disfavor when working in pharmacies. It was argued that women were fond of "social visiting" and that the loss of the opportunity to indulge in this pleasure was a serious problem to a girl. Young men could meet friends after the store closed, but at that hour girls were supposed to be under the parental roof or with a trusted escort.

Critics argued that women had a tendency to "let their right-hand neighbor know what the left one doeth." A gossipy female could very well reveal secrets of complexion and health problems of lady customers and might divulge guarded secrets of men needing prescriptions for hair restorers. One could enumerate many other examples to substantiate this position. This argument prevailed for many years. It was heatedly discussed by members of the California Pharmaceutical Association as late as 1912 when Clayton K. Smith (11) eloquently disputed this alleged propensity to gossip among women pharmacists. In a highly alliterative style Smith noted that "pen pictures are painted by these apostles of apprehension and it does not require a very vivid imagination on the part of the average pharmacist to surmise what some of the more serious situations might be."

Then there was the position of the practical merchant. A particularly outspoken pharmacist put it this way: "I wouldn't give $5.00 a month to the best woman druggist you could produce; I wouldn't have her about if she agreed to work for nothing." This druggist ac-

knowledged her skills in compounding and preparing medicines but declared she would be no good behind the counter (12):

> A large percentage of business comes from people who want advice—advice that doctors are not generally called upon to give. They want a remedy for headache, burns, bunions, chills, indigestion, prostration and nervousness; they come in, show their tongue, describe their discomfort and ask for a dose of something. Now these people would not go to a lady druggist. Men would not trust her judgement. They would argue, wisely enough, that, never having had a 'swelled head' of her own, she could not prescribe intelligently for the relief of that inconvenience. The man with the gripes would hardly go to her, and the pet of society could not be expected to confide the liberal amount of patés, ice-cups and liquors he had allowed himself the previous night.

Our druggist now turns from men to women customers:

> The fair sex believe in men without questioning, and when it comes to a choice between a great woman and a gosling of a man behind the medicine counter the former would be passed every time. Let a woman once get relief, benefit or assistance from a male druggist and nothing will shake her faith in him. She will consult him whenever she is indisposed, act on his advice and prize it above that of the family physician.

Pity the poor girl pharmacy student. Even before she received her diploma, prevalent attitudes caused her considerable difficulty. One woman druggist, writing in 1893, commented on her own pharmacy school experiences. "There is a strong complaint that students in colleges of pharmacy object to the entrance of girls into their classes, and try to carry things with a high hand, indeed, crowding them down and out, and making it exceedingly disagreeable for them." The writer recounts a conversation with one such student (13):

> 'Girls is no good in drug stores,' I heard a 'highly educated' sallow-complexioned drug clerk say one day, as with both hands thrust into his pockets, he sat on the counter and looked at me. 'They are too slow 'n' easy, 'n' they talk too much.' There was three in our class and they all give it up.' 'Why did they give it up?' I asked mildly. 'O, I dunno: 'cause they were *girls*, I guess, or else 'cause they just *wasn't smart.*'

It was particularly difficult even for the "smart" girl to succeed in pharmacy in the 1890s because despite good work in the college she could not graduate with full honors and the diploma until she had three or four years of practical experience in a drug store. This was an exceedingly difficult obstacle for her to overcome because of the prejudicial attitude practiced in stores toward female apprentices.

There were other arguments in opposition to women pharmacists. One claimed that a woman druggist would stay at home when so inclined and would expect special considerations and privileges. But the single, substantive issue behind all these positions was the one spoken by Dr. D. W. Yandell in Louisville to the first class of girl graduates of the School of Pharmacy for Women (14):

> You have chosen to align yourselves with man. You have become his competitor for bread, his rival in work. Look for no other treatment than that he gives his fellows. The lines of commerce are merciless and true banking knows no friends. The homage which has hitherto been spontaneously yielded you will . . . be rendered you no more. Your Mother Hubbards will no longer cause men to bow down at your feet. You have elected this. Competition in pharmacy—rivalry in work—you will find no less sharp than men find it. Many hands that were once held out to you will now have their backs turned toward you. All this you must expect.

The voices of men who championed women pharmacists were heard far less frequently than were those who criticized. The attitude of masculine superiority, although somewhat diminished, could nevertheless be sensed, for ex-

ample, in the statement of Dr. H. H. Rusby of the New York College of Pharmacy who gave women this mixed review:

Women are particularly fitted for work in pharmacy. They are naturally neat and delicate in their handiwork. The average standing of women in the College is better than that of the average man, so far as can be judged by the small number who have so far entered the College. The women are hard students, perhaps because they realize that, being few in number, they have a record to make. It is very possible that if there were more of them they would not do so well. The best women are not up to the standards of the best men. They have not the ability of the men, for they have not had the years of training which undoubtedly makes a great difference.

Dr. Edward Kremers of the University of Wisconsin School of Pharmacy thought it was premature to say much about women in pharmacy but felt confident that "women would work out their own salvation in pharmacy and—need not be compared with men." Kremers (16) saw no value in drawing comparisons and noted that "woman is working her way into the learned professions, and will stay there, whether comparisons are in her favor or against her."

While some men expressed their approval of women pharmacists in prose, others spoke out in poetry. In one such effort, man, in a lyric vein, welcomed the female pharmacist to his ranks (17):

Like sparkles of morning sunbeams,
All sweet with the flowers they kiss,
Comes the gentle evangel of brightness,
The "Registered" girl pharmacist.

She's a vision of heavenly beauty,
A sprite more of that world than this,
But yet of a mundane existence,
This "Registered" girl pharmacist.

She's expert in chemical compounds,
No question in pharmacy missed,
Stood high on botanical quizzes,
This "Registered" girl pharmacist.

Make room all you bachelor chemists,
Make room for this queen on your list,
And crown her with all the attributes,
A "Registered" girl pharmacist.

In a poem entitled "Feminine Pharmacy," another male described her dispensing skills (18):

There in the corner pharmacy,
This lithsome lady lingers,
And potent pills and philters true
Are fashioned by her fingers.

Her phiz behind the soda fount
May oft be seen in summer,
How sweetly foams the soda fizz
When you receive it from her!

In putting up prescriptions she
is fairer than Ophelia,
When mixing belladonna drops
with tincture of lobelia.

Each potion has its proper place
Each poison in its chalice;
Her daedal fingers are so deft
They call her digit Alice.

Finally, there was one man, truly an enlightened spokesman of his day, who called those of his sex to account. In behalf of the faculty gathered at the ninth annual commencement of the Kansas City College of Pharmacy, Professor W. E. Kuhn had these words to say (19):

Not alone to men, the supposed Lords of the creation, is it necessary and benefiting to seek higher spheres of education. I believe that women have the same right to engage in any profession that men have. They have the same right to enter the profession of pharmacy, and they will make just as good pharmacists as the men. I would advise those who think otherwise to go to the drug store—buy a package of flaxseed meal, make a poultice and put it on their heads, and begin to grow a set of nineteenth century brains.

Note should be made here of two ill-fated institutions devoted solely to training women for pharmacy during this era. The Louisville School of Pharmacy

for Women has previously been mentioned. It was organized in 1883 and incorporated one year later. Its founder was Dr. J. P. Barnum, its president was local banker Theo. Harris, and its secretary Dr. E. A. Grant. Barnum employed male clerks in his Louisville pharmacy and it was his intention to hire ladies as well with the expectation of training them in his College. Problems arose because of the mixed classes and the lack of a course in business training which Barnum felt was essential to all graduates seeking their first professional employment. Also, the new college encountered some opposition from the State Board of Pharmacy which first refused to register lady graduates until the courts forced them to comply. Finally the Legislature of Kentucky incorporated the all-female school and by special enactment empowered its graduates to practice their profession without registration or interference by the Board.

The Louisville School of Pharmacy for Women conferred either a certificate of proficiency after completion of two full years of study or a diploma with the degree Graduate of Pharmacy after three years of study or two years plus a year of work experience. One male student actually was graduated from Barnum's first class and went on to become an instructor in general and pharmaceutical chemistry.

Although the school reported an enrollment of fifty-two students for the session of 1891-92, it appears that a total of only fifteen to twenty young women actually were graduated during its existence. There was no college building, and instruction was given in Barnum's store, where lectures and store training were disadvantageously combined. The school was abandoned by its founders in 1892 for lack of patronage.

An even less successful venture than the Louisville school was attempted in Washington, D.C. In 1895, Mrs. Emily Edson Briggs, a newspaper woman who wrote under the name "Olivia," planned the establishment of a technical college for girls which would provide scientific, literary and technical courses. The Olivia Institute was to be self-sustaining and was to have a pharmacy department under the direction of an experienced pharmacist. Five rooms in Mrs. Briggs' home on Maple Square would comprise the school. Mrs. Briggs posted large signs in the community to advertise her school, and at once incurred the enmity of her neighbors. When ordered to remove the signs, she refused, and the complaints were renewed. Here the story ends. No further information on the fate of the well-intentioned Olivia Institute with its pharmacy department for girls has been found.

Does woman have a place in pharmacy? If so, what shall be her tangible achievements? For visitors to the Columbian Exhibition held in Chicago in 1893, there was at least a partial answer. At that site a dispensing pharmacy was established by the Women's Pharmaceutical Association of Illinois, and its operation and conduct entrusted solely to women. With considerable wisdom the Association had obtained the exclusive concession for selling drugs on the fairgrounds, making the Woman's Pharmacy a realistic venture rather than a static display. Equipment, fixtures and stock were donated by many manufacturers, and Professor Remington contributed a copy of his "Practice of Pharmacy" to the ladies. The Woman's Pharmacy was managed by two women having Ph.G. degrees, Miss Jean Gordon and her assistant Miss May Reynolds. This excellent exhibit of a working pharmacy with its stock of drugs and goods was awarded a gold medal before the Exhibition closed in October. It served to bring to the public's eye the image of women as

pharmacists and to convince many that this work could be performed competently by women as well as men.

At the close of this period the public had seen women at work in Chicago's Woman's Pharmacy and, with more frequency, in their local community drug stores. Members of the pharmaceutical profession noted women at work in stores, both as prescriptionists and as proprietors. They were aware of women's role in the dispensaries connected with convents, asylums, hospitals, homes and other charitable institutions. In the colleges and universities a few were seen who took higher degrees in order to teach, while small numbers enrolled in medical schools to become physicians. At first, women anxious to make professional affiliations joined the Women's Auxiliaries to the state pharmaceutical associations, but in time they were welcomed into the Associations themselves, and several achieved recognition by being elected to high office.

On the national level there were numerous women members in the American Pharmaceutical Association, and by 1900 the profession had seen fit to bestow national recognition on its female membership. At the Denver meeting in 1896 Mrs. Mary O. Miner was elected as one of its vice presidents. In addressing the Association on this occasion Mrs. Miner chose her words with deliberation. Perhaps she sensed at that moment some lasting diminution of the uncompromising attitudes which had to that date dealt so harshly with her sex. Her words follow (20):

> I am mindful of the honor you have conferred upon me. I receive it not so much for myself as a tribute you pay to women in pharmacy. For the great American Pharmaceutical Association to admit to its roll of officers, no matter how low a grade of office it may be, a woman, is surely a tribute to women in pharmacy. For this I thank you.

This study concludes with a directory of women pharmacists known to have been graduated from American schools of pharmacy up to and including the year 1900. A small number of nongraduate women pharmacists has been included because each of these women has accomplished some noteworthy achievement pertinent to the scope of this paper. Although many sources were examined in compiling this list, no claim can be made for completeness. The full name of each school cited is found at the end of the directory. Arrangement is alphabetical, with maiden name used whenever possible. The Directory is derived from many sources, including several of the cited papers, school catalogs, and news of the colleges published in the professional and trade journals of the period.

American Women Pharmacists to 1900

Name	School Attended	Year Graduated	Notes
Abbot, Clara May	Wisc.	1892	Prescriptionist.
Adgate, Sarah	N. Y.	1886	
Amerman, Ella	Phila.	1888	Proprietor.
Anderle, Anna			Proprietor; first women licentiate in Wisconsin, circa 1896.
Angell, Clara E.			Proprietor (Rhode Island) in 1890.
Aszmann, Louise H.	Phila.	1896	Hospital pharmacist.
Babb, Alma	Chi.	1897	
Babb, Grace Lee	Phila.	1884	
Baker, Louise	Mass.	1877	Received certificate in lieu of license; first woman graduate from Mass.
Barbat-Winslow, Josephine	Calif.	?	First woman graduate from California; also M.D. degree from California; lecturer in botany & materia medica; college representative at Pharmacopoeal Convention, Washington, D.C., 1900.
Barker, Louisa A.	Phila.	1900	
Bartlett, Hannah F.	Phila.	1896	Also M.D. degree.
Bartlett, Mary E. W.	Mass.	1893	
Behrens, Lena K. (Mrs.)			Registered in Kentucky (1896)
Bell, Jennie E.	Chi.	1886	Second woman graduate from Chi.; proprietor with husband.
Beman, Alicia	Iowa	1896	
Bennett, L. Mc. G.			Proprietor in Santa Rosa, Sebastopol and Oroville, California.
Bennett, Pearl C.	Mich.	1900	
Blankink, Maria (Mrs.)			Proprietor (Chicago); may have not been registered.
Blau, Fanny	N. Y.	1899	
Bock, Augusta A.	St. L.	1892	
Bode, Nellie B.			Hospital pharmacist (District of Columbia)
Boner, J. W.	Purdue	1896	
Brigham, Ida R.	Mass.	1882	Also M.D. degree.
Broder, Bertha	N. Y.	1898	Honor graduate; proprietor.
Bromell, Mary C.	Kansas	1896	
Brooks, Lou			Took junior course in Phil. (1890-91); passed Texas Board in 1891.
Brooks, Lulu	Phila.	1898	Proprietor with sister.
Brunner, Rose S.	N. Y.	1888	Instructor in pharmaceutical arithmetic; prescriptionist.
Bucknam, N. M.	Bklyn.	1894	
Bucknam, P. P.			Also M.D. degree.
Buerle, Henrietta	Mass.	1898	
Butler, Ella B.	Kansas	1900	
Cadwell, Florence	Phila.	1890	Hospital pharmacist.
Cain, Maud F.	Phila.	1895	Also M.D. degree.
Cameron, Mabel	Iowa	1896	
Carlisle, Mary L.	Kansas	1897	
Carey, Helen M.	Wash U.	1896	
Carey, Martha			Certificate (New Jersey, 1877)

American Women Pharmacists (*Continued*)

Name	School Attended	Year Graduated	Notes
Carroll, M. Louise	Cleve.	1896	Proprietor.
Carver, Clara E.	Cinc.	1885	
Case, Luella	Phila.	1896	
Cates, Ada A. (Mrs.)			Clerk in husband's store; member Maine Pharmaceutical Assoc., 1898.
Caulkins, Albert H. (Mrs.)	Purdue	1892	
Chamberlin, Olive L.	Kansas	1899	
Coleman, Julia P. H.	Howard	1897	Postgraduate degree (PhD) from Phila. in 1899; registered in six states and District of Columbia; proprietor in Virginia and Pennsylvania.
Collins, Carrie S. (Mrs.)			Proprietor (Garner, Iowa)
Collins, Mary E.	Mass.	1900	First woman pharmaceutical chemist graduate from Mass.
Conklin, Olie M.	Mass.	1897	
Cook, Mabel J. B.	Kansas	1900	
Cooper, Zada M.	Iowa C.	1897	
Corliss, Eva M.	Wash.	1896	
Coulter, Amee	Mich.	1899	
Courville, Ida E.	National	1894	Prescriptionist.
Cowan, Marion	Mass.	1898	Also M.D. degree.
Crissey, Julia M. (Mrs.)	Chi.	(?)	Also studied in National Institute of Pharmacy; emigrated to Omaha in 1885; proprietor in 1888; repeatedly elected Secretary, Nebraska Pharmaceutical Association; wrote and presented several papers.
Crosby, Mary V. (Mrs.)	N. Y.	1890	Proprietor (Rockaway, N. Y.)
Cummings, Adeline E.	Chi.	1890	
Damm, Augusta	Minn.	1890	
David, Laura	Iowa	1892	
DeCosta, A. R. (Mrs.)	Purdue	1895	
DeGraffe, Bertha L.	Phila.	1896	Certificate of proficiency (chemistry).
DeHaven, Ida V.	Phila.	1898	
Dilworth, Mary	Mich.	1882	
Domingo, Emma C.	Texas	1900	
Dow, Cora C.	Cinc.	1888	Multi-store proprietor; first store owned at age sixteen; pharmacy graduate at age nineteen; owned five stores in 1897.
Dunkel, Martha	Chi.	1888	
Eaton, Mattie	Mich.	1884	College teacher.
Eccles, Mary H.			Also M.D. degree in 1878; proprietor (Brooklyn, N.Y.); American Pharmaceutical Association member in 1893.
Elder, Virginia M.	Wash.	1896	
Elliot, Elizabeth	Chi.	1897	
Elliot, Mary Alice	St. L.	1897	
Emanuel, Julia E.	Mich.	1889	
Emory, Sarah S.	N. Y.	1894	
Enlen, Clara F.	N. Y.	1900	
Etienne, M. (Sister)	Texas	1897	Hospital pharmacist.

American Women Pharmacists (*Continued*)

Name	School Attended	Year Graduated	Notes
Ettinger, Vivian I.	N. Y.	1885	
Everett, May	Texas	1897	
Fendler, Amelia	N. Y.	1889	
Fendler, Louisa	N. Y.	1897	
de Figueroa y Marty, D.	N. Y.	1886	
de Figueroa y Marty, E.	N. Y.	1886	
Fisher, Dora C.	Kansas	1898	
Flanders, Anstrice G.	Mich.	1885	Teaching (principal).
Fleming, Mabel E.	Purdue	1894	
Foster, Nellie	St. L.	1899	
Gage, Florence M.	Wisc.	1898	M.S. degree (Wisc.) in 1900.
Geddes, Lillian M.	Mich.	1893	Proprietor.
Gilbert, Mary K.	Kansas C.	1895	
Gilmer, Maud A.	Kansas	1892	
Goodman, Laura	Cinc.	1885	Proprietor of first female-owned store in San Francisco (1895).
Gordon, Jean	Phila.	1891	Honors graduate; proprietor (Chi.); manager of Woman's Pharmacy, Columbian Exposition, Chicago, 1892.
Granat, Selma	N. Y.	1893	
Gray, Margaret M. (Mrs.)	Chi.	1899	Publisher (pharmacy books); postgraduate degree (Ph.Chem.) in 1901; member Amer. Pharm. Assoc.
Greaves, Edith	Mich.	1891	High school chemistry teacher.
Grebe, Margaret E.	N. Y.	1898	
Greer, Mary C.	Phila.	1898	
Griswold, Viola			Secretary, Women's Pharm. Assoc., Chicago, 1892.
Grote, Emily L.	Wisc.	1892	Proprietor.
Hall, Jessie G.	Mich.	1899	
Hall, Mary A.			Vice president, Women's Pharm. Assoc., Chicago, 1893.
Hancy, Mary A.	Phila.	1895	Hospital pharmacist.
Harbord, Katherine W.	Phila.	1900	
Harders, Mae T.	Phila.	1893	Hospital pharmacist; lecturer in pharmacy.
Harrington, Harriet L.	Mich.	1881	M.D. degree in 1883 (Univ. of Michigan).
Hart, Nine B.	Purdue	1892	
Haydock, Susannah G.	Phila.	1893	Proprietor (Phil.); head of Temple College Dept. of Pharmacy.
Hayhurst, Susan	Phila.	1883	M.D. degree in 1857; pharmacy degree at age sixty-three; first woman graduate of Phila.; chief pharmacist, Woman's Hospital, Philadelphia.
Haynes, Bertha M.	Mass.	1900	
Heard, Mary K.	Mich.	1892	Postgraduate degree (Mich.) 1895; instructor in ophthalmology, otology in University of Iowa.

American Women Pharmacists (*Continued*)

Name	School Attended	Year Graduated	Notes
Hedges, Florence L.	Kansas	1891	
Hedges, Grace L.	Kansas	1896	
Heinemann, Lucy	Chi.	1896	Proprietor with father in Chicago.
Hendershott, Florence	Mich.	1887	Retailing.
Hetrick, Anna L.	Phila.	1895	
Highly, Olive R.	Mass.	1899	
Hilton, Emily K.			Certificate (Socorro, New Mexico) in 1898.
Hirt, Emma	Kansas C.	1895	
Hoeppner, Josephine M.	Wash.	1899	
Hoffman, Edna	Cleve.	1895	First woman graduate from Cleve.
Holland, Herma T. K.	Kansas	1897	
Holt, E. M. (Mrs.)			Certificate (Poland, Maine) 1877.
Hoskins, Florence V.	National	1900	
Howard, Carrie E.	Phila.	1890	Honors graduate at age forty-eight; thesis entitled *Women as Pharmacists;* proprietor (Phil.)
Howze, Sarah B.	Texas	1897	
Jacobi, Mary P.	N. Y.	1863	First woman graduate from N. Y.
James, Charlotte F.	Wisc.	1898	
James, Martha M.	Wisc.	1896	
Jeffers, H. W. (Mrs.)	Purdue	1893	Teacher.
Jester, Lulu Beall	Iowa	1896	
Johnson, L. M.	Maryland	1898	
Johnson, Marion E.	Mich.	1877	Hospital pharmacist.
Johnson, Olive C.	Phila.	1896	Proprietor.
Jones, Gertrude	Mich.	1874	Also M.D. degree.
Jones, Laura M.	Wisc.	?	Graduation date is before 1897; prescriptionist (Madison).
Kaufman, Emma	Chi.	1887	Proprietor with brother in Chicago.
Kimball, Myra W.	Wisc.	1899	
Knapp, Georgia	Iowa	1896	
Knoche, Augusta (Mrs.)	St. L.	1892	First woman graduate from St. L.; retailing.
Kyser, P. B. (Mrs.)			First woman licentiate in North Carolina (1892).
Lacy, Lucretia B.	National	1898	
La Wall, Julie M.	N. Y.	1896	
Levy, Minnie	N. Y.	1899	
Loard, Anna	Phila.	1887	Hospital pharmacist.
Low, Celia			Attended Mass. in 1872 but did not continue.
Mc Clain, Nellie T.	St. L.	1891	
Mc Kane, Sadie E.	N. Y.	1892	
Mackay, Gertrude L.	Wash.	1899	
Mc Neill, Mary	Mich.	1882	Graduate school (Mich.) 1885.
Mc Noah, Grace E.	Mich.	1894	Graduate school (Mich.) 1896.
Mahegin, Katherine C.	N. Y.	1889	
Mahoney, Agnes P.	N. Y.	1895	
Martin, Lucy H. (Mrs.)			Licensed proprietor (Coin, Iowa) 1883.

American Women Pharmacists (*Continued*)

Name	School Attended	Year Graduated	Notes
Mathers, Grace	Phila.	1898	Hospital pharmacist.
Miner, Mary O. (Mrs.)	Phila.	1890	Secretary, Kansas Pharmaceutical Association, 1892; vice president, American Pharmaceutical Association, 1896.
Molwitz, Ernestine	N. Y.	1899	Doctorate (Pharmacy) in 1900.
Morgan, Lulu A.	Phila.	1900	
Naly, Sarah L.	Phila.	1895	Chief pharmacist, Woman's Hospital, Phil.
Nardyz, Emma B.	Phila	1889	
Nash, Ella G.	Mass.	1899	
Nichols, Clara E.	Mich.	1897	Pharmacist, old age home for soldiers.
Nichols, Marion F.	Mich.	1894	Chemist (Upjohn Co.)
Northrup, Austa A.	Kansas	1896	
Noyes, La Belle C.	N. Y.	1898	
O'Connor, Delia	Mich.	1894	Retailing.
O'Connor, Madge	N. Y.	1896	
Oliver, Florence M.	Chi.	1887	Proprietor.
Orein, Delpha	Purdue	1897	
Osbourne, Elizabeth V.	N. Y.	1898	
Packer, Ella P.	Kansas	1899	
Perkins, Mary R.	Kansas	1888	
Phelan, M.	Calif.	?	Graduation date is prior to 1897.
Pierce, Bessie G.	Mich.	1893	
Pierce, Olive B.	Val.	1898	Ran drug store and pharmacy of the Postgraduate Medical School (Chi.) for eight years.
Post, Mary E.	Mich.	1877	Teacher.
Pryer, Clara C.	Mich.	1882	Retailing.
Rabinowich, Fanny	N. Y.	1900	
Rainsford, M. E. St. Clair	N. Y.	1898	
Randall, May I.	Wisc.	1900	
Reigert, Jennie N.	National	1892	
Reynolds, Lillie (Mrs.)	Iowa	1897	
Reynolds, May	Phila.	1892	Worked in Woman's Pharmacy, Columbian Exposition, Chicago, 1892.
Rich, S. Agnes	Mich.	1897	
Richter, Sara E.	Mich.	1897	
Rittenhouse, Jessie S.	Kansas	1900	
Robin, Luba J.	Chi.	1897	
Roby, Ida H.	Ill.	1889	First woman graduate from Ill.; Organized and worked in Women's Pharmacy, Columbian Exposition, Chicago, 1892; proprietor.
Ross, Anna C.	Phila.	1898	Manufacturing (pharmaceuticals).
Rudolph, Eliza (Mrs.)	Tulane	1895	First woman to obtain Master's degree in pharmacy; proprietor; Secretary, Louisiana Pharm. Assoc., 1896.

American Women Pharmacists (*Continued*)

Name	School Attended	Year Graduated	Notes
Rugg, Jennie T.	National	1896	
Ryan, Marie R. (Sister)	Texas	1897	Pharmacist in orphan asylum.
Saunders, A. A. (Mrs.)			First woman registered in Virginia; proprietor (Chase City) in 1886.
Schaumloeff, Marie B.	Iowa	1899	
Schevcik, Mary	N. Y.	1898	
Schorp, Rose	Buffalo	1888	First woman graduate from Buffalo; proprietor.
Service, Caroline B.	Mich.	1898	
Shippee, Mary L.	N. Y.	1899	
Simonet, Susan E.	Albany	?	First woman graduate from Albany.
Sirotta, Hetty	N. Y.	1900	
Slobodkin, Rose	Phila.	1898	Hospital pharmacist; proprietor.
Smiley, Laura M.	Phila.	1897	
Smith, Alice W.	St. L.	1899	
Smith, Marie B.	Mich.	1888	
de Socarras, Angela	N. Y.	1888	
Sprissler, Clara L.	Phila.	1893	
Stauffer, Almeda S.	Kansas	1897	
Steele, Mary E.	Mass.	1895	Hospital pharmacist.
Steinwetel, A. H. (Mrs.)	N. Y.	1884	
Stephen, Annie R. (Mrs.)	Phila.	1895	Proprietor (Reading).
Sterling, H. M. (Mrs.)			First woman registered in Virginia by examination; proprietor (Norfolk)
Stevens, Alice M.	Mich.	1897	
Stimson, Charlotte E.	Ill.	1900	
Stowell, Louisa Reed			In charge of microscopical laboratory, Univ. of Michigan; taught microscopic botany in early 1880's; later a microscopist for U.S. government.
Straight, Augusta De F.	Kansas	1900	
Sturgess, Isa B. (Mrs.)	Chi.	1899	
Sullivan, Mary E. (Mrs.)	Val.	1897	Proprietor.
Sumner, Jennie H.	Mass.	1895	Proprietor (Roxbury).
Tendler, Louisa	N. Y.	1897	Doctorate (Pharmacy) in 1898.
Thomas, Caroline C.	Wisc.	1900	
Thompson, Inez	Purdue	1896	
Tirrell, Marion C.	Chi.	1880	Also spelled Terrill; first woman graduate from Chi.; proprietor with husband of two stores in Chi.; Treasurer, Women's Pharmaceutical Assoc. of Illinois, 1892.
Tozer, Rosamonde L.	Wash.	1897	
Turner, Eliza A.	Albany	1888	Hospital pharmacist; proprietor.
Tyler, Mary F.	Chi.	1889	Proprietor (Roscoe, Ill.)
Uhl, Agnes E.	Purdue	1895	
Upjohn, Mary	Mich.	1871	
Upson, Rosa	Mich.	1881	Degree in pharmacy and medicine; first woman registered by examination in Iowa; delegate to Amer. Pharm. Assoc.; Secretary for seven years beginning in 1892; Secretary to Iowa Pharm. Assoc., 1885; proprietor (Marshalltown, Iowa); emigrated to Wisconsin.

American Women Pharmacists (*Continued*)

Name	School Attended	Year Graduated	Notes
Wait, Cora L.	Mich.	1890	
Wanous, Josephine A.	Minn.	1898	Proprietor; patent holder; delegate from Amer. Pharm. Assoc. to convention of National Wholesale Druggists.
Warner, Helen M.	N. Y.	1891	
Weeks, Mary E.	Val.	1895	Registered in Kentucky in 1896.
Weitzel, Sue C.	Phila.	1897	Proprietor.
West, Katherine P.	Phila.	1899	Asylum pharmacist.
Weston, Edythe	Phila.	1896	Retailing.
Wheeler, Ada (Mrs.)	Chi.	1889	Proprietor (Englewood, Ill.)
White, Bessie Woods	Mich.	1883	Graduated as Pharmaceutical Chemist: first woman to apply for license in Kentucky; license obtained after three years of litigation.
Wilbur, Agnes	Mass.	1892	First woman to receive diploma from Mass.
Wolodarsky, Clara	N. Y.	1900	
Wood, Annie			Licensed proprietor (McGregor, Iowa).
Yaple, Florence	Phila.	1895	Business manager, Amer. J. Pharm., 1894-1912; assistant to Prof. Henry Kramer.
Yates, Carrie, P.	Kansas	1892	
Young, Annie H.	Phila.	1899	
Young, Elizabeth L.	N. Y.	1898	

Albany	Albany College of Pharmacy, Albany, N. Y.
Bklyn.	Brooklyn College of Pharmacy, Brooklyn, N. Y.
Buffalo	Buffalo College of Pharmacy, Buffalo, N. Y.
Calif.	California College of Pharmacy, San Francisco, Calif.
Chi.	Chicago College of Pharmacy, Chicago, Ill.
Cinc.	Cincinnati College of Pharmacy, Cincinnati, Ohio.
Cleve.	Cleveland School of Pharmacy, Cleveland, Ohio.
Howard	Howard University, Medical Department, School of Pharmacy, Washington, D.C.
Ill.	Illinois College of Pharmacy, Department of Northwestern Univ., Chicago, Ill.
Iowa	Iowa College of Pharmacy, Des Moines, Iowa.
Iowa C.	University of Iowa, College of Pharmacy, Iowa City, Iowa.
Kansas	University of Kansas, Department of Pharmacy, Lawrence, Kansas.
Kansas C.	University of Kansas City, Department of Pharmacy, Kansas City, Missouri.
Maryland	Maryland College of Pharmacy, Baltimore, Maryland.
Mass.	Massachusetts College of Pharmacy, Boston, Mass.
Minn.	University of Minnesota, College of Pharmacy, Minneapolis, Minn.
National	National College of Pharmacy, Washington, D.C.
N. Y.	New York College of Pharmacy, New York, N. Y.
Phila.	Philadelphia College of Pharmacy, Philadelphia, Penna.
Purdue	Purdue University, School of Pharmacy, Lafayette, Indiana.
St. L.	Saint Louis College of Pharmacy, Saint Louis, Missouri.
Texas	University of Texas, School of Pharmacy, Galveston, Texas.
Tulane	Tulane University, School of Pharmacy, New Orleans, Louisiana.
Wash.	State College of Washington, Department of Pharmacy, Pullman, Wash.
Wash. U.	Washington University, College of Pharmacy, Seattle, Wash.
Wisc.	University of Wisconsin, School of Pharmacy, Madison, Wisc.
Val.	Valparaiso University, Department of Pharmacy, Valparaiso, Ind.

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Memoir of Catherine L. Bacon 1899–1973

By FRED B. ROGERS, M.D.

Dr. Catherine L. Bacon, from 1958-68 a clinical professor of psychiatry at Temple University School of Medicine, died of heart failure on October 29, 1973, at Falmouth Hospital, Falmouth, Massachusetts. She was 74 years old.

Eminent in psychotherapeutic instruction and investigation, Catherine Crane Lillie Bacon was born at Chicago, Illinois, on June 14, 1899, daughter of the distinguished zoologist Frank R. Lillie and his wife, Frances Crane. Catherine attended Vassar College, was graduated from the University of Chicago (Ph.B.) and received her M.D. degree from Rush Medical College in 1927. Her internship was served at the University of Illinois Research and Education Hospital during 1927-28. Specializing in psychiatry, Dr. Bacon spent twenty years at the Chicago Institute for Psychoanalysis, working with Dr. Franz Alexander and colleagues. She also took postgraduate training at the University of Illinois Institute for Juvenile Research and the Boston Psychopathic Hospital in Massachusetts.

Dr. Bacon came to Philadelphia in 1952 as a staff member of the Department for Mental and Nervous Diseases of the Pennsylvania Hospital. She was a clinical assistant and associate professor of psychiatry at the University of Pennsylvania School of Medicine from 1952-58, before joining the medical faculty at Temple University. A respected training analyst, she served as president of the Philadelphia Psychoanalytic Society during 1956-58. She was elected a Fellow of The College of Physicians of Philadelphia on February 3, 1960.

Dr. Bacon's published writings concerned the psychological mechanisms of pain, asthma, aggression and depression. She contributed to the book, *Direct Analysis and Schizophrenia; Clinical Observations and Evaluations*, authored by Dr. O. Spurgeon English and others (1961). Significant contributions to psychosomatic medicine and psychotherapy came from her research and teaching.

Late in 1967, Dr. Bacon moved to her family's summer home at Woods Hole, Massachusetts. She maintained a limited practice in psychiatry, served on the staff of the Falmouth Hospital, and was a consultant to the Cape Cod Mental Health Clinic at Pocasset.

Surviving are two sons, Frank and Charles; three sisters, Dr. Margaret Lillie Gildea, Mrs. Emily Ann Cramer and Dr. Mary P. Barrows; and a brother, Albert. A memorial service was held at the Church of the Messiah, Woods Hole, with interment in the cemetery there. To her family goes the condolence of many friends from Dr. Bacon's Philadelphia years.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of James Byron Carty 1915–73

By ORVILLE C. KING, M.D.

James Byron Carty, M.D., a member of the The College of Physicians of Philadelphia since 1956, died March 24, 1973, at the age of fifty-eight. Dr. Carty was formerly director of the Division of Surgery at Delaware County Memorial Hospital. He was affiliated with the University of Pennsylvania-Presbyterian Medical Center and was acting surgeon for the U.S. Public Health Service at the St. Agnes Hospital. He was an instructor in surgery at the School of Medicine of the University of Pennsylvania.

Dr. Carty was born in Philadelphia, Pennsylvania, in 1915, the son of Mr. and Mrs. Byron Carty. He was graduated from Lafayette College in 1935 and Jefferson Medical College in 1939. Following an internship at Philadelphia General Hospital, he served as a surgical fellow in the Cleveland Clinic and a resident in the Jefferson Medical College Hospital. Following these appointments, Dr. Carty joined the U.S. Public Health Service, Department of the Coast Guard, in which he served until 1946.

He was certified by both the American Board of Surgery and the American Board of Abdominal Surgery. He was a member of the American College of Surgeons, International College of Surgeons, Philadelphia Academy of Surgery and the American Medical Association.

Other interests of Dr. Carty were the Union League, the Huguenot Society, the Sons of the American Revolution and the Masonic Lodge. While not a prolific writer, he did publish several papers on malignancy of the small bowel.

During the period when he was associated with me, he proved to be an able teacher, excellent clinical surgeon and a loyal and trusted friend. He was held in the highest respect of all those whose privilege it was to know him. It came as a great shock to all of us who knew him to have his career terminated so early.

Dr. Carty is survived by his wife, the former Allie B. Rendleman, and three children, Dr. James B. Carty, Jr., John, and a daughter Sally.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of Giacchino P. Giambalvo 1891–1973

By H. TAYLOR CASWELL, M.D.

Giacchino P. Giambalvo, M.D., clinical professor emeritus of surgery at Temple University School of Medicine, died on April 24, 1973, at the age of eighty-two.

Dr. Giambalvo was born in Santa Margherita, Italy, on April 24, 1891. His family immigrated to the United States and he was educated in the public schools of New York City. He was graduated from Temple University School of Medicine in 1921 and served his internship at Temple University Hospital. Upon completion of his internship, he was appointed to the surgical staff of Temple University Hospital. He retired at the age of seventy-one, having completed fifty years as a faculty member.

He was the first chief of the Department of Surgery at Community Hospital of Philadelphia. Dr. Giambalvo was a member of the Philadelphia County Medical Society, Pennsylvania State Medical Society, American Medical Association, The College of Physicians of Philadelphia, American College of Surgeons, International College of Surgeons, the Society of Chest Surgery of Italy, and an honorary member of the Trivenito Surgical Society of Italy.

For many years, he was a member of the Board of Directors of the General Alumni Association of Temple University.

He was a talented amateur horticulturist, specializing in orchids, camellias, and birds of paradise. He had a keen interest in growing and developing citrus trees and was able to develop trees which produced lemons weighing as much as two pounds.

Throughout his career, Dr. Giambalvo practiced in the Overbrook section of Philadelphia. He was an outstanding clinician and teacher devoted to the care of his patients.

He is survived by his wife, Margaret, and a daughter, Adeline.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of A. Gorman Hills 1915–73

By LIBERATO J. A. DIDIO, M.D., Ph.D.

A. Gorman Hills, M.D., professor of physiology and medicine at the Medical College of Ohio and a Fellow of The College of Physicians of Philadelphia, died on June 19, 1973. He was born in Washington, D.C., on August 5, 1915.

Dr. Hills joined the Medical College faculty on May 1, 1972. His distinguished professional career began with receipt of the Bachelor of Arts degree, cum laude, from Harvard University in 1937. The Doctor of Medicine degree was conferred upon him in 1942 by Johns Hopkins University. His residency was served at Peter Bent Brigham Hospital, and he subsequently served as assistant in medicine at Harvard University Medical School (1946-48). Dr. Hills held successive academic appointments at the University of Pennsylvania (1948-56), and then joined the medical faculty of the University of Miami College of Medicine (Florida) in 1957. With a Special Fellowship from the United States Public Health Service, he spent one year at the Physiology Institute of the Free University of Berlin (1964-65).

Dr. Hills had lectured at the Medical College of Ohio for a period of two years prior to his official appointment. Soon after his joint appointment to the departments of physiology and medicine in 1972, he took charge of the renal segment of the medical curriculum. Throughout his thirty years as a physician and teacher, he published over 100 scientific papers, primarily in the areas of endocrinology and renal physiology. He was a member of the honors medical society of Alpha Omega Alpha. Additionally, he served as Special Consultant to the Surgeon General (1960-64) and was a member of the Editorial Board of the *Journal of Clinical Endocrinology and Metabolism* (1963-68).

In this full and notable career, Dr. Hills set and adhered to the highest standards. The faculty will remember his unfailingly modest and gentlemanly conduct, which was at all times in the highest services of medicine. He was universally respected and admired by his colleagues for his professional accomplishments as well as for his kind and genuine concern for students. He was a devoted teacher and scientist, and was recognized as a scholar in medicine. At the Medical College, he has left a vacancy that cannot be filled.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of Igho Hart Kornblueh 1902–73

By WILLIAM J. ERDMAN, II, M.D.

Igho Hart Kornblueh, M.D., was born in Austria and educated in that country, receiving his medical degree at the University of Vienna. He practiced physical medicine and rehabilitation, heading the departments at Graduate Hospital, Northeastern Hospital and Frankford Hospital; he was also on the staff at Nazareth Hospital.

He had a deep and abiding concern and interest in the relationships between weather and disease, particularly ionization, and travelled extensively on problems of climatology and climate control. He wrote many articles on these subjects. In addition to the usual societies of medical practice associated with his specialty, he was a member of the International Society of Medical Hydrology, the International Society of Biometeorology and the American Meteorologic Society, which awarded him its outstanding achievement in bioclimatology award in 1972. He was a prime mover in organizing the American Institute of Medical Climatology, serving as its executive vice president and a director for 20 years. He stimulated much interest in this field not only among physicians but among engineers, climatologists and psychologists.

Dr. Kornblueh is survived by his devoted wife, Margaret Rosoff Kornblueh.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of William Gilmore Leaman, Jr. 1898–1973

By HOBART A. REIMANN, M.D.

William Gilmore Leaman, Jr., was born in Philadelphia. His boyhood summers on a farm in Chester County led to a life-long love for the countryside. After his retirement in 1963, he and Eleanor spent happy years on Mountain Meadow Farm in Unionville, where he continued his literary work and enjoyed trap-shooting and entertaining friends and groups of medical students. Besides cultivating evergreen trees on a large scale, Dr. Leaman had a deep interest in the Civil War, a detailed knowledge of events of that era and a collection of memorabilia of the time. Death came unexpectedly on April 11, 1973, after a short illness.

Undergraduate work and graduation in medicine at the University of Pennsylvania in 1922 followed those of his father in 1889. Subsequent internship in medicine from 1922 to 1924 and residency in pathology at the University Hospital from 1924 to 1925 preceded a postgraduate year of study with Dr. Richard Cabot in Boston in 1929. The years from 1925 to 1942 were spent in general practice, especially in cardiology.

He served as geographic full-time professor of medicine, head of the Department of Medicine and cardiologist at the then Woman's Medical College from 1942 to 1963, retiring as professor emeritus. Additional appointments were consultant in cardiology at the Veterans Administration Hospital, Misericordia, Northeastern, and Nazareth Hospitals and visiting physician at the Philadelphia General Hospital. He was a member of the American Medical Association, a Fellow of the American College of Physicians, The College of Physicians of Philadelphia and of the Council on Clinical Cardiology of the American Heart Association, and certified by the Board of Internal Medicine, subspecialty cardiology.

Activity at The College of Physicians of Philadelphia included Fellowship, Clerkship and Chairmanship of the Section on General Medicine, Clerkship and Chairmanship of the Section on Medical History, and Council membership during Richard Kern's presidency. He participated in the development of the Kate Hurd-Mead Lecture Series with Samuel X Radbill. He had been president of the Heart Association of Southeastern Pennsylvania, director of the Board of the American Heart Association, a member of the Executive Board of the Pennsylvania Heart Association, and a member of the American Association of the History of Medicine. Numerous articles and a book on the *Management of the Cardiac Patient* (1940) were published. For the past 15 years, his instructive Cardiovascular Briefs appeared regularly in the journal *Pennsylvania Medicine.*

Several honors were bestowed on him, namely, Distinguished Service Awards from the Heart Association of Southeastern Pennsylvania and from the Pennsylvania Heart Association, and the Distinguished Achievement Award from the Southeastern Pennsylvania Heart Association.

William was not a joiner of social clubs but spent his spare time with his family

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at home, first in the city and finally in the country. His wife Eleanor, daughter Nancy and granddaughter Lindsay survive him. All who knew William will hold him in fond remembrance for his tact, thoughtful consideration and tolerance, his skill in the art and science of medicine and especially for his sense of humor. The world was better for his existence.

The Section on Medical History of the College honored the memory of William at the annual Kate Hurd-Mead Lecture on May 15.

Memoir of Edward C. Lodholz 1875–1972

By O. V. BATSON, M.D.

"He was our professor of physiology." I have heard this so often, always said with pride, that it almost seems to be a password among the doctors—physicians, dentists, and veterinarians—who are former students of Edward Lodholz. He is one of the very few medical science teachers to whom a class year book has been dedicated. The medical class of 1923 at the University of Pennsylvania inscribed their book to Dr. Lodholz:

> "In commemoration of his splendid teaching, his keen enthusiasm and his unparalleled friendship."

In January, 1916, the bequest establishing the Isaac Ott Professorship of Physiology became available to the Medico-Chirugical College. In June of that same year the "Medico-Chi" became the Graduate School of Medicine of the University of Pennsylvania. In 1920 Edward Lodholz became the first Isaac Ott Professor of Physiology. For the next years he presented physiology to physicians preparing for the several medical specialties. These lectures were always well organized, logical and related to the specialty of the group present. In retrospect one sees how well his training and even his place in time fitted him for this professorship.

Dr. Lodholz was born in Philadelphia on July 5, 1875. He was a graduate of Phildelphia's Central High School, which in those days was known for its classes in Latin and Greek. He was graduated from the School of Medicine of the University of Pennsylvania in 1897 and was licensed to practice the same year. In the next three years he was successively a resident physician in the Children's Hospital of Philadelphia, the St. Joseph's Hospital in Reading, and the St. Joseph's Hospital in Savannah, Georgia. In 1900, he became a demonstrator in the physiologic laboratory of Professor Edward T. Reichert at the University of Pennsylvania.

In 1900, Philadelphia streets were lighted by gas lamps at night. Center city, including the Penn campus, used direct current electricity; the nickelodeon had not yet appeared; the automobile was a curiosity; the long distance telephone was not yet developed, and the telegraph lines were slow and did not provide simultaneous transmission of multiple messages. Obviously the newspapers could not print much national news. This was compensated for by lectures on many topics by national as well as local speakers. Well prepared and well delivered lectures were the rule. Edward Lodholz's well organized and well spoken lectures mirrored this pattern current in the 1890s.

In 1900, the term 'vitamines' had not been coined by Casimir Funk. Einthoven had not recorded the first electrocardiogram. Neither epinephrine nor insulin had been isolated. "Endocrinology," as Garrison puts it, "although rooted in the prehistoric past, is virtually a creation of the twentieth century."

In 1904, the department of physiology moved into the new medical building with its heavy marble wainscoating. As late as 1930 the University Buildings and Grounds Department still called it the

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"New Medical." There was much more room for both apparatus and students. A teaching schedule covering five and a half days of the week took care of the students from the three university divisions using the laboratory. Checking the University files and the separately kept records of the Dental School, we find the following: In 1912 Dr. Lodholz became Assistant Professor of Physiology in the School of Medicine. He had been advanced to the rank of Assistant Professor of Veterinary Physiology in 1908 and was made Professor in 1916, a rank that he held until 1925. In the dental school he was Demonstrator in Physiology, beginning in 1901; he became Assistant Professor in 1918 and Professor in 1922. Even with all of these activities he was an Instructor in Medicine for the year 1911-12.

In the summer of 1904 Dr. Lodholz worked in Verworn's laboratory in Goettingen. He worked in Bonn for several summers before the First World War and for several summers in Vienna between the wars. He was interested in the physiology of the special senses, especially vision and olfaction. He became a Fellow of The College of Physicians in 1907. He was a member of, among other societies, the American Physiological Society and the Federation for Experimental Biology.

Edward Lodholz read widely and, I would say, critically. He was almost retiring but always very approachable. He always gave a direct answer to any question. He had a subdued but very keen sense of humor. With his retirement he enjoyed the additional time available for serious reading, which he carried on until the end.

Memoir of I. S. Ravdin
1894–1972

By BROOKE ROBERTS, M.D.

Dr. Isidor Schwaner Ravdin died on August 27, 1972. With this simple statement, it seemed to many of us who have grown up under his surgical influence that an epic in our lives had come to an end. There have been, I believe, few men in medicine who so deeply affected those individuals whose careers they helped shape.

Dr. Ravdin was born in Evansville, Indiana, on October 10, 1894, where his father, likewise the son of a physician, practiced medicine. His early education was obtained in the local schools.

In 1916, he was graduated from Indiana University with a Bachelor of Science degree, having completed two years of medical training. He then transferred to the School of Medicine of the University of Pennsylvania as a third year student. Here he started a life-long friendship with his new roommate, Eugene P. Pendergrass, and other members of his class, many of whom remained in Philadelphia following their medical training. He was graduated from the University of Pennsylvania in 1918 with an M.D. degree and then served a rotating internship at the Hospital of the University of Pennsylvania. In 1919, he was appointed instructor in surgery in that school and became chief resident in the University Hospital. In 1921, he married Dr. Elizabeth Glenn who was the first woman to become an intern at the University Hospital and who was his co-author in one of his early papers on blood transfusion. In 1927, he went to the University of Edinburgh and worked with Sir Edward Sharpey Schaefer and Sir David Wallace and later with Sir Henry Dale in London. It was notable that Dr. Ravdin always pursued surgery as a physiologic discipline. The pathophysiologic situation associated with the surgical disease rather than the performance of surgical procedures was the aspect of surgery that interested him most.

Following his year abroad, he returned to Philadelphia and resumed his investigative work, his teaching and the practice of surgery in this city. In 1928, he was appointed the first director of the Harrison Department of Surgical Research and, in 1935, became the Harrison Professor of Surgery. He remained director of this research department for the next 25 years, except for the period when he was away in the military service.

In the thirties, Dr. Ravdin and his associates vigorously pursued problems related to function of the gallbladder and those associated with liver injury and protection. Many fundamental discoveries were made relative to these organs. In this work, he collaborated with Drs. Regal, Morrison, Vars, Goldschmidt, Rhoads and others. The effects of protein on healing and other parameters such as intestinal motility were also investigated. Nutrition in surgical patients and the problems of blood replacement and blood substitutes were of long-term interest to Dr. Ravdin, and studies in these areas were carried out before and after the war. As an index of his productivity in 1938 alone, he and

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his collaborators published more than 20 papers. In 1940, Dr. Ravdin himself developed acute cholecystitis and it was characteristic of him that he asked Dr. Jonathan Rhoads to operate, although Dr. Rhoads had completed his formal surgical training with Dr. Ravdin less than a year before. Dr. Allen Whipple, the chairman of the Department of Surgery at Columbia, who had come from New York, and Dr. Eldridge Ellison, the chairman of the Department of Surgery at the University of Pennsylvania, were both present, but Dr. Rhoads was the surgeon. Such demonstrations of confidence are not soon forgotten by younger men, and this was the type of thing that Dr. Ravdin did repeatedly.

Following the attack on Pearl Harbor in December, 1941, Dr. Ravdin and Dr. Perrin Long were sent to Hawaii by our Government to survey the medical needs of the military there. Both of these men were noted for their work with sulfonamides which at that time were felt to be of major importance in the handling of traumatic wounds.

In 1942, Dr. Ravdin was instrumental with others in forming the 20th General Hospital. This unit was staffed from the University of Pennsylvania. The 20th General Hospital left for India in January, 1943 and, in November of that year, Dr. Ravdin was given command of the hospital. At that time, he held the rank of colonel. From all accounts, he did a magnificent job under most difficult conditions in building the unit from a small, inadequately equipped group of huts, into an outstanding hospital caring for 2500 patients at a time. In 1945, he was promoted to brigidier general, thus becoming the only general officer in our army ever to command an overseas hospital during war. Later that year, following cessation of hostilities, he returned to the University of Pennsylvania where he had been appointed John Rhea Barton Professor of Surgery and chairman of the Department, a position he held until 1959.

During Dr. Ravdin's term as chairman, the Department of Surgery grew rapidly and gained both in stature and strength from his leadership. It was also during these years that Dr. Ravdin was made an honorary Fellow of the Royal College of Surgeons of England, of Canada, and of Edinburgh, that he was promoted to major general (the first reserve officer to achieve this rank in the history of the Medical Corps) and that he was called upon to help in the surgical care of the President of the United States. During this period, he also held important positions in Washington and elsewhere. He was on the National Advisory Cancer Council and subsequently the National Advisory Health Council. He was active in the American Cancer Society and became its president in 1962 and 1963. He was chairman of the Board of Regents of the American College of Surgeons from 1954 to 1959 and the year following was its president. He was president of the American Surgical Association in 1958. During these years, he was also given the Philadelphia Award, the Stritmatter Award of The Philadelphia County Medical Society and honorary degrees by both universities from which he had graduated and eight additional institutions.

In 1959, Dr. Ravdin gave up the chairmanship of the Department of Surgery to become vice president in charge of medical affairs of the University of Pennsylvania. In this position, he organized the unique bicentennial celebration of the School of Medicine under the theme "One Medicine" and launched a major drive for the improvement of the schools under his aegis.

The Ravdin Institute, first conceived in 1952, was finished in 1962. This building, now the major clinical facility

of the Hospital of the University of Pennsylvania, is a unique tribute to Dr. Ravdin. The impetus and a large portion of the funds for its construction came from Dr. Ravdin's friends and patients who wanted to construct an addition to the hospital that was a suitable tribute to him.

In 1967, Dr. Ravdin's great mental powers began to fail. Electroencephalographic tracings at that time showed evidence of cortical destruction. From this time until his death five years later, there was slow but progressive loss of mental acuity which was perhaps the most tragic possible exodus for this great man.

To give the simple biographical facts of Dr. Ravdin's life does not convey the extraordinary quality of his character, except perhaps as one sees how he was repeatedly chosen to preside over those organizations to which he belonged. Perhaps, therefore, the author may be pardoned for adding a few personal impressions and recollections about him.

It is my own belief that in the years following the war. Dr. Ravdin thought that he would probably die of a myocardial infarction and, against this, he would take no precaution. Dr. Ravdin suffered from angina pectoris as well as from claudication but would do his best to hide it from all. Only those who worked with him constantly knew he would not walk more than about 75 yards without stopping usually for some animated conversation. At other times, he would stop operating for brief periods with a look of pain in his eye, but never a word of reference was made to these episodes. When, in 1960, Dr. Ravdin suffered a brief but very severe degree of ischemia of his right leg, he fully recognized the possibility of losing his limb. It was at this point that he became willing to give up the use of tobacco and to take anticoagulants, something which he had not done before. It is my belief that whereas he had no fear of death from a myocardial infarction, he did not view loss of a limb with equal equanimity.

Dr. Ravdin, more than any man I have known, seemed to understand intuitively how those about him would react to varying situations. By the same token, he could do the little thing or the big that was most likely to influence them. To watch him go into a patient's room and change a totally dejected individual into one with optimism was an education in itself. Having personally been a patient of Dr. Ravdin's, I can attest to the extraordinary lift that his presence gave to a patient when he walked into his room. Somehow, with him there, patients became confident that things would straighten out, even though while alone they were not at all certain that such was true. When he was with a patient, the patient had his entire attention and, although the visit might be brief, the patient did not feel that he was rushed. For Dr. Ravdin to have been able to create this feeling in the midst of his constant activity was truly amazing.

In the same way that he encouraged patients, he was constantly stimulating those about him to do their best possible work. He himself had an extraordinary capacity for work and never asked more of those under him than he himself was willing to do. His energy was boundless and he seemed to live with minimal sleep. Those of us whose sleep requirements were in the more average range, could never keep up to him. Even in the few hours that he did sleep, however, I can never recall a time that I telephoned him (and they were numerous) that he did not thank me for having kept him informed. Being kept informed on the condition of his patients was something upon which he absolutely insisted. When problems arose, he wanted to be made

aware of them immediately. One of the worst errors that a member of his house staff could make was to try to hide from Dr. Ravdin some untoward event that had occurred to a patient. On the other hand, if one had made an error, there was no one who was more understanding than Dr. Ravdin, and, if one of us was in trouble, there was no one to whom we could turn for a more sympathetic ear and a helping hand. There were countless people throughout Dr. Ravdin's life who felt indebted to him in addition to his patients who were truly devoted.

When someone working with Dr. Ravdin had done a good job, he would not only be praised but praised publicly. If something displeased Dr. Ravdin, his censure was usually in private (except in the operating room). When operating, his emotions seemed "closer to the surface" than at other times and if things had not gone well during the first operation of the day, it was apt to be a "bad morning in the O. R." For this reason, we who arranged his schedules would try to begin with an uncomplicated cholecystectomy, an operation he thoroughly enjoyed and did very well. We would never start with a radical mastectomy if it could be avoided. This was an operation that he clearly did not enjoy because of the disfigurement and other implications that it carried for his patient.

Dr. Ravdin was a rapid operator and any unnecessary waste of time he found irritating. He had too many things to do to permit time to be wasted. He was always in the hospital a few minutes before six o'clock and often had dictated for an hour or more at home before leaving. He usually started his eight o'clock case ten minutes before the hour, by which time he had taken care of some of his desk work and personally seen all his more seriously ill patients.

Among the qualities of Dr. Ravdin that those of us who worked with him greatly admired was his ability to make the right decision on the basis of relatively little information. He seemed to have a sixth sense, intuitively knowing what was wrong with a patient and what to do about it. By no means was he infallible, but we were repeatedly impressed by how often subsequent events proved him correct in judgements or decisions that at the time seemed questionable. This was true of all sorts of problems, not just medical ones. I often wondered whether this ability reflected his extraordinary memory or his deep understanding of people and how they react, but that it existed, I have no doubt. In fact, I believe Dr. Ravdin, in the early years that I knew him following World War II, had the fastest and most perceptive mind of any man with whom I personally have come in contact. Dr. Ravdin also had the happy facility of not worrying over decisions that he had reached. Having concentrated on a subject and reached a decision, he would not then dwell on it but go on to something else. Without this ability he could never have carried the diverse and extraordinary number of obligations that he had simultaneously. He could and did delegate authority with great skill and those to whom it had been given felt his strength and support behind them, but he always remained the coordinator.

As a teacher, he was superb. Not only was his own fund of knowledge enormous, but he had an unique ability to make classes sparkle. "Grand Rounds" in his early days as chairman, were held on Tuesday afternoons. They were in fact rounds, but then the numbers who attended became too great so that the format was changed and patients were brought to the group assembled in the amphitheater. This too was soon outgrown and we then had to move into a larger auditorium. When "the Professor" was there, things were always lively and he had always done his homework

before the meeting. That students and other surgeons should be attracted to these rounds was not surprising.

Dr. Ravdin's affection and pride in the men he trained was similar in many ways to that of a father for his sons. Throughout his life, he always tried to help all the men he had trained and his ability to do so was enormous. By the same token, many of his "boys" would turn to him for advice, years after having left his side. Never was there a hint of jealousy if one of his "boys" did something outstanding, only one of pride. Small wonder that Dr. Ravdin engendered intense loyalty from those who had been his residents. He was truly an extraordinary chief and those of us who worked with him were indeed fortunate.

Despite his extraordinary energy, Dr. Ravdin strongly believed in having some time for relaxation and interests in things other than medicine. In the years after the war, he would love to go to his land in Bucks County where he and Dr. Elizabeth built a house and enjoyed their gardening. Dr. Ravdin's knowledge of plants was extensive and his knowledge of the various species of holly in particular was far greater than most professional horticulturists. In addition, he was interested in civic matters and served as a Trustee of both the Philadelphia Museum of Art and the Rosenbach Museum. With his death, Philadelphia lost one of her greatest citizens.

Dr. Ravdin is survived by his wife, Dr. Elizabeth Glenn Ravdin, by his daughter, Elizabeth Ravdin Bergus, by his son, William D. Ravdin and by eleven grandchildren. His son, Dr. Robert Glenn Ravdin, on whom he depended heavily during his last years of practice, died suddenly a few months before his father.

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The Breast Cancer Controversy[1]

By GEORGE CRILE, JR., M.D.[2]

Rebuttal by

Dr. GEORGE ROSEMOND

Mr. President, it is a pleasure to meet you after many years. I have recollections of you at the Harvard Medical School. To see you now on the red velvet chair with cap and gown is extraordinary.

I do think that it is fitting that this lecture, which was made possible by Catherine MacFarlane, who was a gynecologist and an early proponent of early cancer detection, should be on this subject, which is of such great interest to all of us today.

I am quite convinced in my own mind that the main cause today for delay in patients' seeking treatment for lumps in the breast is not ignorance of the significance of that lump. The American Cancer Society has done a magnificent job of educating people. The main thing that deters women today from seeking treatment is fear of treatment.

[1] The Catherine Macfarlane Lecture on Cancer Control II, The College of Physicians of Philadelphia, 3 October 1973.

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I propose tonight, as I have proposed for some time, that the conventional radical mastectomy, as originated in England more than a century ago by Moore and which was popularized at Johns Hopkins by Halsted, is an archaic procedure. In its day, it was all that could be done, but today, it has no indication whatsoever. I say that because, at the time of Halsted, if you go back in the *Annals of Surgery* and read the description of his first fifty cases, you will find that 30% of them had ulceration at the time they were seen, and the average size tumor was that of an orange, and that these women, all except the two that did not have cancer at all, had matted axillary nodes. All of them would have been inoperable by our standards. His local recurrence rate, therefore, was extremely high, even after only a few months. The ultimate local recurrence rate was about 40%, and the only reason that they all did not recur was probably because they died before they could. This was the best that could be done for a desperate local situation

before radiation was invented. Unfortunately, this operation became standardized and was used in all cases.

Today we have situations in which we find a tumor on a mammogram with typical tiny calcifications and the question is not how to do the radical mastectomy but how to find the tumor. Yet, we take out muscles. Why? We do it for the sake of convention, we do it from failure to think, and we do it, in my opinion, from absolute disrespect for the suffering of the patient. We have not thought of morbidity. I am the first to admit that morbidity is perfectly acceptable when there is a definite return in terms of saving lives. But there is not a single scientific randomized trial (and there have been many done abroad) in which in the same institution in the same period of time, alternate patients were treated by one way or another, in which radical mastectomy has had a better survival rate in five or ten years than a simpler operation which does not entail so much more morbidity.

I think it would warm Doctor MacFarlane's heart to know the tremendous advances in diagnosis which have taken place in her field, gynecology. That is a result of educational programs of the American Cancer Society and of the simple and painless Pap. test. Women have come to confide in and trust their gynecologists to whom they go for their annual Pap. smear. This has been a great advance. Now the gynecologist has these women almost hypnotized to come in regularly for this. The Pap. smear has become a symbol of cancer, and I think that some women think that if it is negative it means you have no cancer in your body. I don't think that all of them know that it is specific to the cervix. But in any event, it is good, because they are coming to the gynecologist.

Today the gynecologist not only checks the pelvis but also examines the breasts, and this is most important. Here I want to make a point which your great Philadelphia surgeon Dr. George Rosemond has made so forcibly in a number of publications, the last of which was in the American Cancer Society Bulletin, *CA*, namely, that breast cysts, occurring in the vulnerable age of the late thirties, forties, and even early fifties, are the commonest tumors of the breast. There are many, many cysts for each cancer, and yet in many parts of this country, women are subjected to operations for these cysts, which scare them to death, because the woman undergoes an anesthetic, after having been told, "If it's a cancer, we will of course have to to the radical mastectomy." I have seen women who have gone through this ordeal six or seven times in three or four years, and so have you, Dr. Rosemond, I am sure. If a woman consults Dr. Rosemond, however, he simply needles the cyst, draws out the contents, and the patient is cured. She goes home. She needs no operation.

Why don't doctors aspirate breast cysts and tumors? Because they don't think of the patient, the patient who suffers not only the physical discomfort of an operation, but the mental torture of waiting a week for hospitalization, then going to sleep not knowing whether or not she is going to wake up with a radical mastectomy. This is lack of consideration, because for more than 25 years repeated studies have shown that there is no harm whatsoever in needling a cancer. Furthermore, in 85% of the cases, if you aspirate tissue juice from a cancer through a fine (20 gauge) needle and make a Pap. smear of it, a good pathologist can tell you that this is a cancer. Then you can talk to the patient and plan treatment without having the patient undergo the uncertainty of biopsy.

If aspiration biopsy is negative, all it

means is that you did not get cancer cells. You still have to take a biopsy. But you don't have to talk to the patient about a mastectomy, because, if the aspiration biopsy was negative, the chances are ten to one that open biopsy is not going to show cancer. It is better, therefore, not to wait for this patient to be admitted to the hospital but to do the open biopsy in the operating room, usually under general anesthesia, but as an in-and-out. If the tumor does happen to be malignant, you can just as well do the main operation later when the pathology has been fully evaluated. Why haven't we done this more often? Haagensen and others have long ago shown that no harm is done by separating excisional biopsy and the definitive operation.

I think we have failed to separate biopsy and mastectomy because we haven't thought of the patient. That is why I have decided that the time has come to go to the patient, because if a doctor isn't going to think of the patient, then I think the patient has to think of herself, and for that reason, I am going public, informing women about what's available.

Now let us look at some of the evidence about the results of various treatments of breast cancer.

If you reread Halsted's original article on the results of radical mastectomy, you must conclude that the devil himself inspired Halsted. He couldn't have put that incision in a place which is more awkward for a woman to hide. He couldn't have cut more lymphatics than by making an incision that goes up onto the shoulder. He took out a great deal of skin, which you had to do in those days, of course, because 25% of the tumors were ulcerated and their average size that of an orange.

But our tumors aren't like that any more. Yet, in many parts of the country surgeons graft skin almost routinely in a radical mastectomy. Why? Repeated articles in the literature show that from the standpoint of local recurrence there is no advantage to skin grafting, nor is it necessary to take all the muscles or to make verticle excisions or destroy all the lymph drainage of the arm. If the radical mastectomy is done right (and Dr. Rosemond and others are modifying the operation so that they don't do such terrible deforming things), you don't get much swelling. If you don't go to the apex of the axilla, if you don't take all of the nodes that drain the arm, if you leave the pectoral muscles, in short, if you do something reasonable, the morbidity of axillary dissection is low. If the tumor has spread to many lymph nodes and to the apex of the axilla, then you use radiation instead. Radiation is just as effective as surgery in controlling breast cancer in nodes during the lifetime of a patient with advanced nodal metastasis. In fact, Haagensen and Guttman have shown that patients with extensive apical metastases live longer after radiation than after radical surgery. Morbidity is the price that the patient pays for radical surgery, a needless price because there is no advantage. The skin is cut paper thin on the bare ribs, very uncomfortable, and there of course, is the local recurrence, which actually is fostered by the very procedure which it is meant to avoid. When you cut skin thin, you destroy its blood supply and you block its lymphatic drainage. The deep lymphatics are not in the fat and blood vessels that surgeons take off to make these thin flaps; lymphatics are in the deep layers of the skin itself, and they are preserved along with the cancer cells that are in them. Cancer cells are stimulated to growth by the same damage which so frequently causes the sloughing of skin after this procedure. In every laboratory study that has ever

been done, anything that damages tissue causes cancer to grow ten to twenty times faster. Everything that blocks circulation causes growth of cancer; cancer cells are trapped, so there is a higher incidence of local recurrence if you cut thin flaps.

This is the kind of cancer they had in Halsted's day, ulcerating cancers. Fortunately these are becoming rare. Many of the ones we see today are in people who have been nurses or people who have seen in hospitals or offices the results of the radical mastectomy. They simply can't screw up their courage to accept treatment. This cancer is in the breast of a nurse who simply could not accept the idea of radical treatment. Twenty-five percent of the patients at the Cleveland Clinic who wait until they have inoperable cancers have been associated with the medical profession, some of them even doctor's wives, and many more were teachers. In these cases the delay was not from lack of intelligence and not from ignorance. It was fear of treatment, which caused the delay.

The important thing for the public to know is that you do not have to do a radical operation to control cancer locally. That is all one needs to worry about, for by the time a cancer is as large as this, and ulcerating, it is incurable systemically. No matter what is done, you are never going to cure this woman permanently. But what can you do with radiation? You can control the cancer locally with radiation, almost always. There is very little indication for radical surgery in extensive local cancer, and I give full credit to Dr. Haagensen who has done so much to prove to the world that this is the case.

I am not advocating radiation over surgery, because radiation is a double-edged sword: it does a lot of good; it also causes a lot of morbidity. The woman who is heavily radiated for an inflammatory cancer of the breast is almost as uncomfortable as a result of the limitation of motion of her shoulder girdle, the fibrosis of her muscles and the thickening and discomfort of her skin as she would have been after a radical operation. After high doses of radiation, some patients get edema of the arm too. Radiation is not to be used unless necessary. I have seen one woman with an inflammatory cancer of the breast who has lived for 12 years, which is unusual.

Although this is the most modern method of treatment, it is really not very modern. It is the treatment my father always used. (Sitting in the front row is a gentleman who has a card of admission to the American College of Surgeons signed by my father in 1921. I won't reveal his age, but long before 1921 my father used to do the modified radical mastectomy.) My father never believed in Halsted; he thought Halsted's operation was a sort of caricature of surgery, which took six and eight hours to do—a thing that took my father half an hour to three-quarters of an hour to do. My father's results were just as good as anybody's, but he couldn't convince me of that at that time; because I was my father's son, I was gung-ho for radical surgery, and so I did radicals for fifteen years before I saw the light. A converted sinner, you know, is the one who learns the lesson best, and he is the most religious. The incision for a simple or modified radical mastectomy ought to go under the axillary hair line, and then the patient has perfect motion of the arm. It is very rare that you get any swelling. The thick skin flaps and intact muscles assure a perfectly comfortable chest wall. Simple mastectomies were done in 63% of our patients, modified radicals in 36%, true radicals in less than 1%. We have done no radical operations for the last ten years. Cobalt has been

given postoperatively in 25%. We now give it in only 15% or 20%. Some of these had partial mastectomies with or without axillary dissection or radiation, so it's a diversified form of treatment. Of course, if patients treated by simple mastectomy later developed palpable involvement of nodes, they were operated upon later, and the nodes were removed.

We have compared the results at five and at ten years of the Cleveland Clinic series with the National End Results in Cancer. This Cancer Registry is composed of patients from the states of Connecticut, Massachusetts, California, and five university hospitals. The patients are very carefully followed. At the time of the survey, radical mastectomy was standard treatment for the patients in the Cancer Registry group. We at the Cleveland Clinic were doing fewer than 1% radical mastectomies; they were using radical mastectomy almost exclusively. The proportion of true Stage I cancers was almost the same: ours was 52% and theirs was 53%. The five year survival rates of inoperable stage III and IV cancers were practically the same, ours 14% and theirs 12%, showing that the selection of cases for operation was similar in the two groups. At five years, we had them beaten by 10% in survival, 71% to 61%; at ten years the survival rates were identical, 43%. So I think that all you can say is that patients die a little faster when they are treated by radical operations. The end results however are the same, because if the patient has distant metastasis, it will catch up with her sooner or later.

It seems that if you remove regional nodes by big operations or radiate regional nodes and thymus, you often break the immunologic defenses. You can in tumor-bearing mice. I am not going to go into the immunological details tonight, because I have written about the subject a lot and everybody is aware that the regional nodes and lymphocytes in general are an integral part of the body's defense against cancer. I don't think the immune defense protects the patient completely; I don't think immunologic resistance cures many cancers with distant metastasis, but impairment of this resistance certainly has a tremendous impact upon the speed of development of the tumor. But the five year survival rate seems to be distinctly higher after simple operations than it is after radical ones.

Now, you say, a simple operation is bad because sometimes you must leave cancer in the nodes. There is no question that we do. If you deal with a group of outpatient people of very low intelligence and very low cooperation, or with shifting groups of people who move around and can't be followed, you cannot trust them to come back for check-ups and so you should not do simple operations. You can't forget about the axilla; you have to check on it periodically. If, however, you have patients who are intelligent and will come back, you can check the axilla periodically and when you feel anything you can go ahead and dissect the axilla and the delay has done no harm.

At the Cleveland Clinic we had two groups of patients. In both of them, at the time of operation, the surgeon felt that there was no involvement of the axilla. My colleagues during this same period of time that I was doing simple operations were still using modified radical operations routinely, even when they could feel nothing in the axilla. Thus the patients were staged in the same way, but they removed the nodes and I did not. In some of theirs the pathologist found involved nodes in spite of the fact that they could feel nothing at the time of axillary exploration. The five-year survival rate of their patients

was 64%. During the same period, I did simple operations, waited until the nodes appeared, then removed them, and my survival rate was 65%. There were only 28 cases in one group and 24 in the other, too few to be of statistical significance. But at least the delay did not appear to diminish the five-year survival rate. At ten years, the results were the same, with still a slight advantage with a simple operation, and these two were really quite similarly staged, since 39% had three or more nodes involved as compared to 33%. So there was no difference in the two groups. There is no advantage in other words, in shooting the whole works the first time, when you see a patient with cancer. If the nodes don't seem to be involved, and if the nodes that are going to be involved are in an accessible place where you can feel them, you can just as well wait until they are involved and remove them then. The patient will have just as good, if not slightly better results and unnecessary lymphadenectomies are avoided.

Our experience shows that when nodes are not involved the results are significantly better if you do not remove the nodes. This is true also in mice. If you remove noninvolved notes, you get rapid spread and twice as much metastasis as you do if you leave them alone.

Sometimes we are criticized for doing partial mastectomies. I wish to make it clear that we don't do partial mastectomies on everybody, only in selected cases.

We do not do what the English call a lumpectomy. We do a real partial mastectomy. If you view the breast as a pie, and the pie as being elastic, like rubber, and if you take a large section out of that pie including a small tumor which is very peripheral and on the very edge of the pie, then that pie can be sewn together again and reconstructed. It is a little smaller than it was before, but it looks very much like the original pie. The overlying skin is taken, a large amount of breast tissue clear of the cancer, and the underlying fascia. But we do this only in selected cases. The tumor must be small in relationship to the size of the breast; it must be peripherally located, and when you take out this big piece of pie, many, many sections of the area must show no multicentric cancer. When you comply with these rules, you get very good results after partial mastectomy. The selection of cases in the group treated by partial mastectomy and in the much larger group treated by total mastectomy and followed for ten years was similar: 51% of each group were Stage I. Sixty-eight percent of the patients with partial mastectomy lived five years, and 38% lived 10 years, as compared with 71% and 43% of the patients treated by total mastectomy—no significant difference. Local recurrences took place in 5% and 4% respectively. Again, no significant difference. So, in properly selected cases, there is no advantage in removing the entire breast. You can't do that in all cases. It would be absurd to give women the idea that a big tumor beneath the nipple or a multicentric tumor can be treated in that way; it simply can't.

Trends in breast cancer operations are changing. An article has just appeared by Dr. Devitt of Ottawa who used to be a proponent of radical mastectomy. He is Director of Education at the University of Ottawa, and he now comes out categorically and says that there is no place for radical mastectomy, but that even so 50% of the Canadian operations are still radical mastectomies. But the percentage is lower than that of the United States, where the radical mastectomy is still the most common operation. Dr. Ray Lawson of Montreal has operated on three sisters with breast cancer over the past decade, who demonstrate his change in thinking. One was operated on by radical mastectomy ten years ago, one by modified radical about

six years ago, and one by partial just a few years ago. So this is the kind of change that is going on now, and this is typical of the change all over the world. This spring I took a tour through Europe looking at the breast clinics, and everywhere you see the swing away from radical mastectomy. It really makes you wonder what in the world is holding us back in this country. In both France and England I saw many partial mastectomies.

In a partial mastectomy, we remove the fascia overlying the muscle. In order to be sure that we don't cut close to the tumor, we go behind the fascia with our finger, we feel the tumor between thumb and finger so we know exactly where the tumor is, and then we cut very wide of it on the other side. Afterward the patient has a little flattening of the breast, which is perfectly acceptable. For lower quadrant lesions we make transverse incisions excising an elipse of skin, breast, and fascia. You can't even see the scar, because the breast hangs over it. The patient may have radiation too. We sometimes use radiation on inner guadrant lesions because of the internal mammary chain, but only if the tumors are large.

We have done a retrospective, randomized study of breast cancer. What we did was to take a small group of 53 patients, all of whom had had partial mastectomies five to eighteen years ago. We could classify them as to what stage their cancers were, because if they hadn't had radiation and never developed involvement of lymph nodes, we could call them true Stage I cancers. All of these have been followed from five to as long as eighteen years. We also have the measurements of the tumors. So we took the small group treated by partial mastectomy and matched them with a large group that had had total mastectomies. We matched the first one on the list, let's say a 2 cm. tumor, Stage I, with the first one in the radical list that was 2 cm., Stage I, matching each case with the first one that matched. When all were matched out, we compared the survival rate of the matched pairs. Of course, they matched for stage, of course they matched for size, and they happened to match also for age (that was a happenstance), they had all had invasive cancer, and it happened that three of each group died of other causes. There were three local recurrences after partial mastectomy and four after total; 77% of the patients lived five years after partial and 70% after total. No significant difference. The numbers are too small, but certainly we lost nothing at all by doing the partial mastectomy.

Now I challenge anybody to tell me any study with radical mastectomy in clinical Stage I breast cancer, with or without radiation, which has ever shown a higher five- or ten-year survival rate than simpler operations with or without radiation. Such a study does not exist. In the presence of this knowledge, I think it is the duty of every physician who talks to a patient with breast cancer to say that there is no scientific proof that the radical operation is more curative and better than lesser operations. We all know that the morbidity of the radical operation is much greater. Regardless of what the physician's opinion is, regardless of what he wants to do, I think he is bound to state those facts, because there is no denying them. And that's why I am spending the rest of my life talking and working for this, so that women will come to their doctors and demand that their physicians do not do a radical mastectomy.

COMMENTS BY GEORGE ROSEMOND, M.D.[3]

It has been a pleasure to me to hear Dr. Crile tonight. I have discussed things

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with him on a number of occasions, have been on panels with him, and if you will permit me I will make a few remarks about his approach to breast cancer. He is always thought-provoking, and I am glad to see that since his retirement from active practice, his fire has in no way dimmed. He is still as interesting as ever. I don't know that I always agree with him, but since I'm here supposedly to add controversy to this, I am going to do the best I can; however, most of the time, we in most things have agreed in the past. Dr. Crile has written a book, as you may know, and I'd like to give his book a little plug. The book is called *What Women Should Know About the Breast Cancer Controversy.* My feeling is that it is not fit for the average woman, but it would be very well if doctors read it. It's all right with me if anybody reads it because I do think that women like to read medical books. A few days ago I received a complimentary copy, and I read it with considerable interest. It's extremely well written and it's quite thought-provoking. I'm going to quote several passages from it. I had to look around to find something to disagree with, I might say, because much in his book I did agree with, especially the part that he wrote about my approach to aspiration of breast cysts. I thought that was awfully good. On page 100 he talks about partial mastectomy: "The chief disadvantage of partial mastectomy is that some cancers are not confined to the lump itself, but are scattered through the entire breast. If the surgeon removes only part of the breast where the lump is located, the microscopic tumors located elsewhere may grow and necessitate mastectomy. Also, tumor may be left in lymph nodes, but these can be removed later with just as good prospects of cure as when removed at the first operation." I think many of us would question that latter statement about "just as safe," because I feel that cancer, while it's still present, does have an opportunity to metastasize, and I would rather see all of it gone the first time. We haven't had awfully good luck with cancers that recurred, even though they recurred in an area where incomplete resection had been done. And so I am a little worried about that particular part of it. He goes on to say: "The chief advantage of partial mastectomy is that it preserves the nipple and most of the breast," and I am surely in agreement with that, but I do think that we have not quite come to the point of being willing to accept a return of local tumor. At least I haven't.

Then he says, among the do's and don't's, "Refuse to submit to radical mastectomy." This is an instruction to the patient, obviously, because this is what women should know about breast cancer controversy. I think it should be what women doctors should know, but that's the way it's put. He says, "Refuse to submit to radical mastectomy. In my opinion, there is no longer any justification for its use. Find a doctor who will do a modified radical operation or something less." Now, I think that is rather dangerous advice to give to a patient, and I would like for you to think about that and see whether you would really like to work under such universal circumstances or not, because most women are going to choose something less, if the choice is left entirely up to them, in my opinion. Many people are not as careful in their selection as Dr. Crile has been, I can assure you.

Later on in his book, Dr. Crile says, "If you elect to be treated by partial mastectomy" (and this sounds as if it's entirely up to the patient, although he certainly doesn't mean that I'm sure), "remember that it takes more skill and knowledge of breast cancer to do this operation properly than to remove all the breast, so pick your surgeon accord-

ingly." The inference could be here, in my opinion, that you elect your own therapy, and I think that's the inference the great number of women have gotten when they have read some of the material that Dr. Crile has written in the public press. Of course, it has gotten into the public press in one way or another, and of course, this book is obviously for public consumption. Also, I think this is a rather poor way to judge surgical skill. I would hope that I can do any type of operation on the breast, and I think most breast surgeons can. It's much simpler to me to take out part of the breast than to remove the entire breast, although a radical mastectomy itself is not a difficult operation.

Dr. Crile continues, "Remember that so long as any breast tissue remains, the woman who has had a breast cancer has a greater chance of getting a new breast cancer than does a woman who has never had a breast cancer; for this reason, from the standpoint of getting a new cancer, total mastectomy gives more protection than partial mastectomy, and removing both breasts gives more protection than removing one." I suppose I agree wholeheartedly with this. There is a little doubt that if you leave more breast tissue you've got less breast to have breast cancer in. But, it does worry me if you leave breast cancer that was removable at the first time in the original breast, and I think that's the important thing. That's the point where we, our points of view, differ. It would appear that Dr. Crile is reacting, as many of us have, to the tendency of some to disregard the present and future rehabilitation of the patient who has breast cancer, and there is little doubt in my mind that quality of survival is of extreme importance. In my opinion, he is overacting when he appears to encourage the patient in this emotion-wrought circumstance to dictate to her chosen surgeon the type of treatment that she will accept. Now, I know he doesn't mean it that way, but that's the way it comes out in the minds of quite a number of women, I'm sure.

It is well known and this has been authenticated, but certainly does not apply to his partial mastectomy, that you cannot see the extent of breast cancer. If surgeons who have just excised local areas for purposes of total biopsy have gone back (there is a study in this respect), in the area around the breast, they have found that 59% of those in one series did have some tumor removed which was not grossly obvious. This is certainly not comparable to what Dr. Crile is talking about, but it does point up the one point: that it is rather difficult to tell grossly the extent of tumor in a breast, and a lot of people try to do that. Dr. Crile doesn't, as a matter of fact; he goes through all sorts of procedures with a pathologist to be sure that he hasn't got any tumor in the periphery before he starts. And so a thing like this, if it is being considered by any of you, should be considered with extreme care. Haywood reported 20% local recurrence in small peripherally located cancers treated by partial mastectomy with a 5 cm. grossly normal margin, compared with 8% with radical mastectomy in the same general area. These cases were also treated with X-ray therapy, so they are not entirely comparable. They did have equal survival, five to ten years, in a small number that reached that period. According to Haywood, he published this as a preliminary report, and I think that's the way it ought to be accepted. His cases have not been followed in great numbers, and I don't believe that we can make final conclusions based on his work. It may be that there are a few cancer types that can be treated safely with less than a total mastectomy. There is little doubt

about that, and I think that we all know that getting out the cancer is the important thing. The question is, how do you know whether you have gotten it out or not. Dr. Crile is retired from active practice and has left a large number of surgeons in active practice in a rather uncomfortable position, I can assure you, which he is trying to do, of course. Present evidence, still not thoroughly studied, does not adequately as yet support his position, in my opinion. Premature acceptance of his thesis could tend to nullify expected improvement in prognosis so optimistically anticipated because of recent improvements in early diagnosis technology. I do appreciate Dr. Crile's efforts related to the control of breast cancer. I certainly think that his idea that fear is an important factor in keeping women from coming to the doctor is undoubtedly true. I do believe that we should offer to the patient as much reward as possible for early diagnosis, so that they will feel that if they come in early enough, they will get something less than a markedly deforming procedure. I have read, as I say, Dr. Crile's very well-written book with much interest. However, I fear his enthusiasm for partial mastectomy has outstripped the available evidence, and if widely and maybe in some instances loosely applied, could cost salvage of lives. He avoids, by the way, talking about the patients that are not going to live, but he talks about the ones that get recurrence. Well, when they get recurrence, I am in trouble as far as I am concerned. In the meantime, if the ongoing randomized clinical study by the adjuvant groups shows that results with total mastectomy compare favorably with the well-documented results of a radical mastectomy, and if the pilot studies that are going on now of partial mastectomy are clearly justified, serious consideration might be given to a similar study involving partial mastectomy under very stringent protocol. I wonder whether the protocol can be made stringent enough to satisfy very many people in this country at this time. I think that the reason we haven't accepted a lesser procedure very quickly in this country is that maybe we may not be as big suckers as they are in other areas. We are just not sure. The present position of the American Cancer Society, based on presently available evidence with which I agree, is as follows: "Surgeons who favor removal of the entire breast and the lymph nodes in the axilla, do so because this procedure has consistently offered a very satisfactory survival rate for early cancer. Also, this technique allows for the removal of multicentric cancer which is frequently found in other parts of the same breast, as well as cancer which often involves the axillary lymph nodes and cannot be detected by physical examination." The surgical principle here is the removal of all possible existing cancer within the scope of the operation. Studies on the various techniques of treatment for primary operable breast cancer are now underway in a number of United States institutions. However, it will take several years before the results are available. In the meantime, the policy, then, of the American Cancer Society is the following: 1., Removal of the entire breast, most often called the radical or modified radical mastectomy, is recommended for the surgical treatment of operable breast cancer. 2., Limited surgical procedures which remove less than the entire breast have not been scientifically proven to be as effective as mastectomy. 3., Recommendations for the treatment of breast cancer should be made by the physician on an individual basis, only after careful evaluation aided by diagnostic studies. Such recommendations are related to the

type, size, location, extent of tumor and other pertinent factors. 4., The patient and selected members of the family should be thoroughly advised by the physician about the proposed surgery and its rationale, this being the essence of informed consent. 5., The American Cancer Society is committed to rehabilitate the patient following surgery for breast cancer. The society has developed a Reach to Recovery Program, which, at the request of physicians, sends trained volunteers who have had a mastectomy and have adjusted well, to visit mastectomy patients in the hospital. This program now brings information, psychological, cosmetic and physical rehabilitation to about one of every two women undergoing mastectomy in the United States. The Society takes a position that most of the physical and emotional problems related to mastectomy can be offset by planned rehabilitation, and so of course you should take into consideration when you do the particular procedure that it is not so radical as it used to be. This plus every reasonable chance for cure is the right of every woman who develops breast cancer. 6., The American Cancer Society is continuing its support of research into the causes, detection, diagnosis and treatment of breast cancer, as one of its highest priorities. It is our belief and hope that the tragic toll from this disease can be prevented by early diagnosis and early treatment. We also believe that American women should be well informed about these medical matters so that they may intelligently discuss these important considerations with their respective physicians. Now this is a different thing from telling the physician what to do, and of course Dr. Crile means it this way also. 7., Any patient having breast cancer or indeed suspecting that she may have breast cancer should consult a physician who is knowledgable in this field, seek his advice, and rely on his judgement in the selection of treatment for her individual medical situation.

Now you notice this is a rather broad span and doesn't refer to radical mastectomy *per se.* Meanwhile, we should not deny prompt treatment to those women who will not accept what we consider the best treatment, whoever we happen to be. I remember a woman very well, who came to me having seen quite a number of physicians and having refused a radical mastectomy, who by the time she came to me had a supraclavicular node. If inordinate delay is the alternative, I would choose partial mastectomy anytime, I can assure you. Dr. Crile's motives, which I am sure are sincere, are already being misunderstood. I might say that yesterday I got a call at my office from a woman who wanted to know if I would do a lumpectomy on her. I told her that I hadn't even seen her and the chances were she had a cyst in her breast anyway and it would not require surgery at all. I think that this is the appropriate approach we ought to take. We shouldn't be sold on any one procedure by any one way of doing things. We should keep our minds open. Obviously all of us in this field would like to do as little mutilating as possible, and the quality of survival is of extreme importance.

The Effects of the Design of Housing on the Behavior and Attitudes of Residents[1]

By OSCAR NEWMAN[2]

Over the past four years an interdisciplinary team of architects and psychologists has been studying the attitudes and behavior of moderate-income families living in differently designed housing environments in cities across the country. We were prompted to undertake this study because of the high incidence of tenant rejection of these environments, many of which followed the most current theories of the architectural and planning professions. The abandonment of these housing projects usually followed a period of intense vandalism accompanied by high crime rates. The interviewing of residents revealed that high crime and vandalism rates paralleled predominant feelings of isolation and despondency among tenants.

In our study, as in the paper which follows, we have used crime and vandalism rates as the most significant measures of poor housing design because they are the final symptoms to come into evidence prior to a development's abandonment by its tenants.

We have found that, in comparing like populations, the physical form of housing developments is the most important ingredient in predicting the crime rates. Our thesis is that for any given density, in any urban setting, architects have the option of designing a variety of environments of radically different form. These different physical attributes either can facilitate residents to adopt concerned attitudes and enable them to control activity in their developments or can make them very vulnerable to criminal activity.

The design of contemporary housing is paradoxical. At a time when ethnic and cultural bonds no longer lead to spontaneous awareness of community identity, there appears to be still less recognition of the potential uses of physical design as a means of promoting positive social outcomes. Physical isolation of family from family, typical of much contemporary high-rise design has, more than ever, come to imply social isolation as well. The creation of large, monolithic projects has come to imply social anonymity.

An important by-product of this trend has been the abrogation of responsibility for maintaining the security of areas around the home to police and other public authorities. Residents feel that they have little right to question the presence of strangers near their homes; and, even if they think this within their mandate, they are reluctant to take the chance. High-rise elevators, lobbies, corridors provide no advance warning of impending danger, no behavioral choices other than direct defense or complete submission to an intruder. There are few opportunities to develop informal interdependencies among neighbors which would directly discourage crime and vandalism.

Street crimes may have reached epidemic proportions because of this lack of concern for the social consequences

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of residential design. Modern residences have encapsulated man from his neighbors, made improbable the development of local allegiances, relieved the individual of the capacity to defend his own territory and, in short, made police and the courts his only line of defense.

In large low- and moderate-income housing, the breakdown of territoriality as a productive social mechanism has been more complete than in other residential environments. Halls, lobbies, and grounds are, by law, considered public facilities. This means that the small penumbra of safety surrounding the home has, by definition, been eliminated. Strangers have a legal right to enter zones which in non-public housing are considered restricted areas. Furthermore, residents are incapable of hiring doormen or elevator operators who are a necessary adjunct for achieving definition in high-rise apartment building environments.

Perhaps most important, it has eliminated an outstanding means of crime control and territorial defense—the concept of the intruder or stranger. In modern society, group identity has been detached from its moorings in shared, community-oriented space. With this transformation of the group, the concept of "strangers" and "familiars," so long an active shaping force in animal evolution, has been given over to social utopian conceptions of man: that to define someone as a stranger dehumanizes the opponent and is the source of racism, social strife and war. This humanistic philosophy would have it that all strangers be treated amiably as members of the "family of man."

For the most part, we are resigned, perhaps doomed, to live a deterritorialized existence in contemporary cities. In dense modern cities, territorial behaviors are especially limited. Individual and familial relations to a particular place have to be streamlined to accommodate shared proprietary rights on the part of thousands or millions of fellow residents. Perhaps the only place that remains to be defended as territory is the apartment unit itself. Now even this vestige of security is threatened. Given the current crime problem, we are more likely to submit to violation of the home than to defend it as a last bastion of identity, individuality, and security. In some ways, the automobile may be the last reminder of true territorial expansion by man toward a feature of the environment outside the limits of the body. If anything, territory in cities has become a mere symbol of status; it is no longer a stage for enacting the drama of life, a focus of existence for the total man.

Human territoriality is regulated both by code and by willingness to enter into, and participate in, a culturally defined social contract. In present times, the rights of the individual against spatial or social invasion are intended as guaranteed by law and do not require individual defense of personal rights. The State gives to the individual or group a wide range of options and means of recourse if his person, his property or even his ideas are violated.

As we are beginning to recognize, it is harder and harder to feel secure about the effectiveness of these nonbiological legal supports. Court cases drag on for years and rarely provide actual compensation for violations. Police cannot hope to investigate the hundreds of thousands of burglaries and robberies that occur in cities each year. In general, there is little hope of recourse by law for the man on the street.

Our system of justice in urban areas may have been given an undue burden of responsibility. At present, all cracks and crevices on the urban frontier require supervision and control by police. Without long-range attachments to places, families are merely living in momentarily

occupied sites on this abstract urban landscape. Their positive social energies, as well as their built-in capacity to defend an area of the city against violation, may have been sacrificed in the race to achieve an open society. It is possible, however, that the job of insuring justice is too large and too diverse to be handled by police and courts alone. New mechanisms may be required to give individual citizens more options and opportunities to make their energies felt in the battle against crime.

Just as space operated beneficially in the evolution of animals, it has been friend and ally to man in the history of civilization. Having a space of one's own allowed men to feel invulnerable to violation. The traditional home provided a retreat from the insecurities and anxieties of life; its boundaries were clear and firmly defended against invasion. In a striking analogy to the animal world, the traditional home even had a "penumbra of safety" around it in the form of a lawn or a yard.

In the animal world, a similar penumbra around the home territory exists as a strip of land in which no hunting occurs. A mechanism evolved which prevented animals from instinctively attacking their own young in the midst of a hunting foray.

In modern cities, the lesson of animal territoriality—of a penumbra around the home—has been repeatedly and carelessly violated.

Perhaps these and other lessons of animal societies state a biologically defined minimum relationship to habitat which has to be understood, addressed, compensated for, or overcome by planners of modern cities. The pendulum has swung to a point where we have come to believe man is free of his biological heritage. On the other hand, while it is well to recognize the unnecessary limitations imposed by the noble savage view—of a romantic bondage to our instincts—it is also time to recognize the positive function of this legacy as a means of reducing conflict and enhancing identity and security.

In the evolution of human habitat over the past thousands of years, men in every culture have developed cogent devices to define the territorial realm of their dwellings. The nature and function of these mechanisms evolved slowly through change and adaptation during use. So long as human environment was built within a tradition, simply repeating previous forms ensured the preservation of past learned experience. With the breakdown of building tradition, through the rapid evolution of new techniques and the need to answer the pressing problem of accommodating higher densities, the simple repetition of past practice has become difficult, if not impossible. Unfortunately, the accumulated traditions inherent in the residential forms of the past were not held within the conscious verbal bank of human knowledge. In architectural history there is ample evidence of territorial definition and symbolization in the forms of previous residential environments. There is unfortunately no parallel evidence of their overt discussion. The tradition, grown over thousands of years, in man's piecemeal search for a form of residence in an urban setting, has been lost.

In building the residential environments of twentieth-century cities, there was no reference to tradition, simply because the needs seemed so totally new and unlike any experience in the past. In our rush to provide housing for the urban immigrants and to accommodate our high population growth rate, we have been building *more* without really asking *what*? The high-rise prototype, with its myriad of resident janitorial and security staff, worked well for upper-

middle-income families with few children but cannot be simplistically transplanted, minus the accompanying staff and accoutrements, for the use of large low-income families. It is clear that we built without much thought and without much concern and are now stuck with the results. Poorly designed buildings and projects have crime rates as much as three times higher than those of adjacent projects housing socially identical residents at similar densities.

Considering the needs of low-income families, there is no rationale to the design of most high-rise residential developments, other than the narrow dictates of investment economics. Once built, they prove dangerous to live in and costly to maintain. The economic argument which led to their initial construction is reversed exactly. Their cost of operation is surpassed only by the social costs borne by the inhabitants. High-rise apartment developments are a new genre, with us little more than a hundred years. As a means for housing low- and middle-income American families, most date back to the early fifties. They are not the result of a careful application of the knowledge employed in housing the few transferred to the problems of housing the many. Their form evolved in response to pressures for higher densities, with no reference to previous traditions and no attempt at understanding the range of need to be answered in human habitat. Beyond an occasionally successful composition, there is little evidence of any genius and now, in this period of high crime rates, they have become containers for the victimization of their inhabitants.

Through first-hand and statistical analysis of over a hundred housing projects across the country, both public and private, we have formulated a model for residential environments which incorporates those ingredients of their physical design which have crime-inhibiting qualities. Our selection of design aggregates for this model have had a common goal: to isolate those mechanisms which allow residents themselves to assume responsibility for insuring a safe, productive, and well-maintained living environment, mechanisms which also thwart the criminal's initial recognition of opportunity. We have termed this model "defensible space."

Defensible space encompasses a range of physical mechanisms: the re-assignment of previously public areas to the private domain of particular residents; the subdivision of grounds into small clusters to faciliate recognition among residents; the use of real and symbolic barriers to define zones of influence; the provision of new opportunities for surveillance, the alteration of the image of the housing project to make it blend more readily into the surrounding community—all of which, it is hypothesized, serve to bring an environment under the control of its inhabitants. The theory claims that the subdivision of projects and the grouping of dwelling units serve to reinforce associations among residents for mutual benefit. It further states that by delineating areas and paths of movement, by defining areas of activity for particular users through their juxtaposition with internal living spaces and by providing inhabitants with natural opportunities for the visual surveillance of the exterior and interior public areas of their environment it is possible to create a clear understanding of the function of spaces, what activities can acceptably occur in them, and who their primary users will be. A "defensible environment," it is hypothesized, will lead residents to adopt potent territorial attitudes and policing measures which, in the end, are the strongest deterrents to potential criminal and vandal activity.

For a group of inhabitants to be able

to set the norms of behavior and the nature of activity possible within a particular place, it is necessary that they have clear, unambiguous control over what can occur there. Design can make it possible for both inhabitant and stranger to perceive that an area is under the undisputed sphere of influence of a particular family or small group of families. This can be made so clearly evident that residents will not only feel confident, but even feel it incumbent upon themselves to question the comings and goings of people to insure the continued safety and maintenance of the defined areas.

As an example, the area outside a building, by the ingredients of its design and its relation to adjoining buildings and activity areas, may come to be understood as being public in nature and so will support a range of ambiguous behavior: inhabitant and intruder alike can roam or loiter freely without having to give account of himself or his pursuits. The same space—redesigned, and reconnected with surrounding buildings and activity areas, both internal and external—can come to take on a definite semi-private tone. This redefinition may involve both real and symbolic barriers, or the reassociation of areas, but through its transition the range of activity which can occur within it will have been severely limited. The space will no longer tolerate ambiguity: the loitering of a stranger within its confines no longer "fits" and will not go untested.

Defensible space design returns to the productive use of residents the public areas beyond the doors of individual apartments: the hallways, lobbies, grounds and surrounding streets—areas that are now beyond the control of inhabitants. Defensible space can be made to operate in an evolving hierarchy from level to level in the collective human habitat to extend from apartment to street. It is a technique applicable to low-density row-house groupings as well as to developments composed of high-rise apartment buildings. The small cluster of apartments at each floor of a multi-story building is the first level beyond the apartment unit where occupants can be made to extend the realm of their homes and responsibilities. The second level is the common entry and circulation paths within their buildings. The third level is the clustering of buildings that define a project's grounds and its entry. The final level in the hierarchy occurs when the housing development stakes its claim on the surrounding streets.

In our examination of developments in every major city in the country, an effort was made to study and compare the housing of all income groups. The techniques included interviews with inhabitants, project managers, and the police who serve these developments. Where recorded data on crime, vandalism and maintenance costs were available, they were incorporated into the analysis. In New York City the analysis has been most extensive and detailed.

The results of our findings from three years of study apply to residential design for most income groups. In all instances, the physical mechanisms suggested to create safety and to improve upkeep are tools of "self-help." The designs catalyze the natural impulses of residents, rather than forcing them to surrender their shared social responsibilities to any formal authority, whether police, management, security guards, or doormen.

Before embarking on a detailed discussion of how building design and project layout combine to produce a defensible space environment, it would be useful to examine the general design characteristics of typical housing projects suffering high crime rates. There are five or six physical aspects that reinforce criminal

behavior, and these occur both in developments built for low- and middle-income occupancy. The projects are usually very large, accommodating over 1,000 families, and consist of high-rise apartment towers over seven stories in height. The sites are usually an assembly of what were previously four to six separate city blocks, now amalgamated into one giant superblock closed to city traffic. The buildings are positioned on the site in a rather free compositional fashion. Designed as one continuous space, the grounds move freely among the buildings and open onto the surrounding streets. However, there is seldom any attempt to differentiate the grounds so as to make portions relate to a particular building or cluster of buildings.

The buildings themselves are commonly slab or cruciform towers, housing from 150 to 500 families. They generally have a single lobby that faces onto the interior grounds of the development. The lobby itself contains a mailbox area and a waiting space for a bank of two to four elevators. A typical floor consists of a long central corridor with apartments lining both sides, which is designated in the building profession as a "double-loaded corridor." The elevator bank is located at the center of this corridor.

To furnish sufficient exits in fire emergencies, two and occasionally four sets of emergency stairwells are provided, running full height of the building. Sometimes two sets of stairs are grouped together behind the elevators in what is called a "scissors-stair" configuration; at other times the emergency stairs are located at the ends of the corridors. (Location requirements are determined by local building codes.) Every set of stairs requires its own exit at the ground level. One or two exits may be allowed to be located within the lobby. A high-rise tower will have from one to four exits in addition to the main entry.

What has just been described is no doubt a common enough phenomenon, well within the experience of most cities. The only difference between a low-income and a high-income development is the presence of fences and guards or a doorman for each of the buildings in the upper income project. These slight, but expensive additions, however, are what make the one a workable habitat and the other not. Similar high-rise residential developments for low- and middle-income families, devoid of the doormen, guards, and resident superintendents, become pasturelands for criminals.

The high-rise apartment tower is primarily a by-product of the need to build at higher densities to justify inflated land costs. Whereas, at under 60 units to the acre, a variety of building prototypes are still available to a housing designer, once 75 units per acre is reached, the high-rise slab becomes about the only option open. Crime rate has been found to increase almost proportionately with building height.

Project size has also been found to affect crime rate. If greater building height and project size are coupled, the probability of crime increases to the extent that it is possible to guarantee a higher crime rate in virtually all projects of excessive height and size. In New York City, 95 percent of the housing authority's projects greater than six stories in height and larger than 1,000 units in size have higher crime rates per 1,000 population than those that are both smaller and lower.

The apparent effect of building height on crime is quite evident. But what is most interesting is that in buildings of six stories or less, the project size or total number of units does not really make much difference. In fact, projects of 1,000 units under six stories in height

have a lower crime rate than smaller-sized projects of similar height. In terms of our hypothesis, larger projects encourage crime by fostering feelings of anonymity, isolation, irresponsibility, lack of identity with surroundings, etc. Our evidence indicates that the low buildings are less conducive to crime. Since projects greater than 1,000 units with buildings of seven or more stories have the highest rate, the facts indicate that it is not large size alone, but large size in combination with greater height that contributes to a more criminally active situation.

The Brownsville and Van Dyke projects in Brooklyn illustrate the effect of physical design upon tenants' attitudes and behavior, as well as upon the crime rates. These projects were paired for study because of their similar project size, housing density, and population composition, factors which many believe should affect the crime rate. Both house approximately 6,000 persons and have exactly the same density: 288 persons per acre. The Brownsville buildings are three to six stories high and cover 23 percent of the available land, while Van Dyke buildings are a mix of 3-story and 14-story buildings covering 16.6 percent of the site. Of the total Van Dyke population, 76 percent occupy the high rise slabs.

Although Brownsville and Van Dyke house comparatively identical populations in size and social characteristics, the high rise towers of Van Dyke are totally devoid of defensible space qualities, while the buildings at Brownsville are comparatively well endowed with such qualities. At Van Dyke, each of the buildings sits independently on the site, with large open spaces separating it from its neighbors. At Brownsville, buildings and site placement divide the project into small, more manageable zones. The open center of Van Dyke, separated from and unrelated to the buildings, contrasts sharply with the small, human scale areas attached to Brownsville buildings, and monitored by the residents.

None of the buildings at Van Dyke may be entered directly from the public street, but require entry from the project interior, forcing tenants to walk along blind paths to reach their buildings. The entrances to the high rise buildings are small doors shared by 112 to 136 families. At Brownsville, buildings are entered through different doors, each serving between 9 and 13 families. Unlike Van Dyke, many of these entry areas are located just off the public street and serve to set off the buildings from the street itself by acting as intervening buffer areas, as well as providing surveillance opportunities for those entering the buildings.

Building interior arrangements of the two projects differ considerably and affect residents' attitudes and behavior. Van Dyke's double-loaded corridors serve eight families per floor and are considered to be public spaces unsuitable for children's play. Residents do not extend their feelings of propriety and responsibility to these hallways, and therefore no areas of extended territoriality exist beyond their apartments and little communication occurs among families on the same floor. At Brownsville, six families share a floor and their apartments are grouped into two sets of three units around a common vestibule. Skip-stop elevators and an open central stairwell assure vertical communication among residents. Parents allow their children to play in the halls and stairways, which are viewed as shared areas of concern and responsibility. By simply leaving apartment doors ajar (not advisable at Van Dyke), parents keep an auditory "watch" as their children play.

Attitudes held by and about the police show distinct differences in the two

projects. Police express pessimism about the value of themselves at Van Dyke Houses. At Brownsville they are much more optimistic and, in subtle ways, respond to complaints with more vigor and concern. All these factors produce a significant positive effect in Brownsville. At Van Dyke the negative factors of anonymity, police pessimism, tenant feelings of ambiguity about strangers caused by large numbers of families sharing one entrance, conspire to erode progressively any residual faith in the effectiveness of community or official response to crime.

Crime and vandalism are major problems at both Van Dyke and Brownsville. A comparison of 1969 crime incident rates and maintenance rates reveals that Van Dyke has had 50 percent more total crime incidents, over 3½ times as many robberies (384 percent), 64 percent more felonies, misdemeanors and offenses, and 39 percent more repair maintenance work than Brownsville.

In summary, it seems unmistakable that physical design plays a very significant role in crime rate. It should also be kept in mind that the defensible space qualities inherent in the Brownsville design are there for the most part by accident. From a critical defensible space point of view, Brownsville is far from perfect. The comparison of the crime and vandalism rates in the two projects was made using gross crime data on both projects. Twenty-three percent of the apartments at Van Dyke consist of three-story walkup buildings serving a small number of families. It is likely that comparative data on crime rates in the low buildings versus the towers at Van Dyke would reveal significant differences. This would make the comparison of crime rates between Van Dyke and Brownsville even more startling.

Commercial Opportunities in United States Health Care in the 1970s[1]

By RICHARD L. HUGHES[2]

Health care expenditures in the United States amounted to $83.4 billion in fiscal year 1972. The continued growth in expenditures has received much publicity with increasing demands in recent years to halt the spiraling costs. Figure 1 measures the increase over the past twenty years and clearly indicates the dramatic rise in the 1960s. We believe that health care expenditures will continue to increase, probably doubling over the next decade, but that they will represent a smaller proportion of the GNP.

There are several reasons for increases in health care expenditures. Some of the more pertinent factors are summarized in Figure 2. In the last twenty years nearly one-half of the gain has come from inflation. Also there has been greater utilization of health care by the population as well as new medical developments providing better care for more people. The final major element is the absolute growth in the U.S. population.

We believe that these same elements will continue to represent major factors in the increased health care budget, with inflation continuing to be the dominant factor. We anticipate that there will be greater utilization of health care services, particularly in some of the current lesser used health services such as dentistry and optical problems. Finally, we expect that the change in the population mix will be a positive stimulus. While the rate of growth in total population will not equal that of the past, there will be changes occurring within the age sectors. The over-65 population will be exhibiting the greatest growth; this sector should also have the greatest demand on health care services.

We have found it useful in analyzing health care to try to gain an appreciation of where health care dollars are spent. Figure 3 represents the distribution of health care dollars in 1972 and our projections for 1977 and 1982. Hospitals have been the largest users of health care dollars, and during the next decade their share will increase even further. The second major factor, professional service, is expected to decline by the end of the decade as a percent of the health care budget.

An important consideration in analyzing the health care budget is to determine how the money is being spent. Figure 4 clearly demonstrates that the bulk of the budget is being spent for fees and salaries. While this factor will continue, we also believe that increasing salary demands will result in greater opportunity for the consumption of products to make more effective the available labor component. The $83.4 billion health care budget includes $14.5 billion for health care products, or 17% of the total budget. We expect that by the end of the decade $32.1 billion will be spent for health care products representing over 19% of the $168 billion health care budget.

Before reviewing the commercial opportunities in detail, it might be informa-

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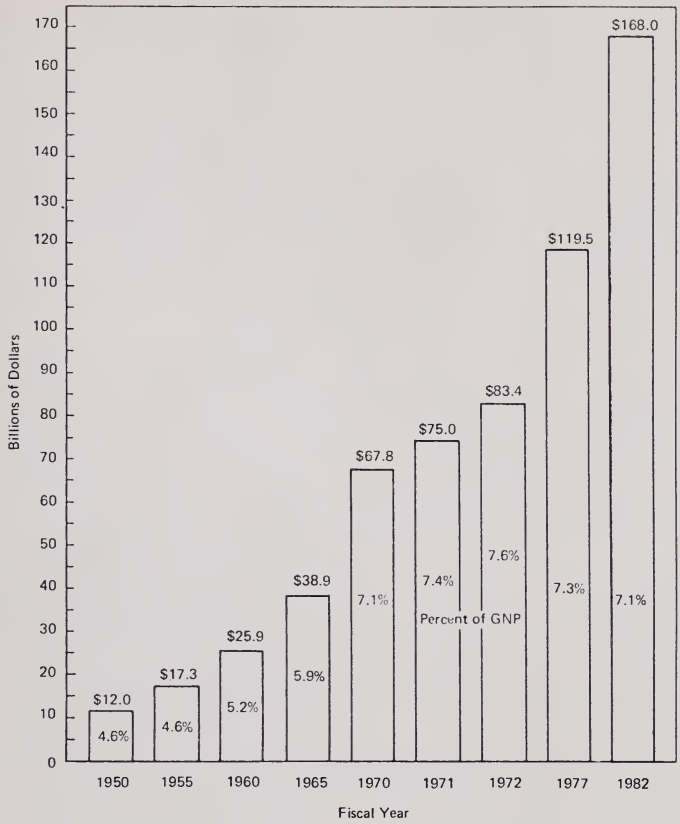


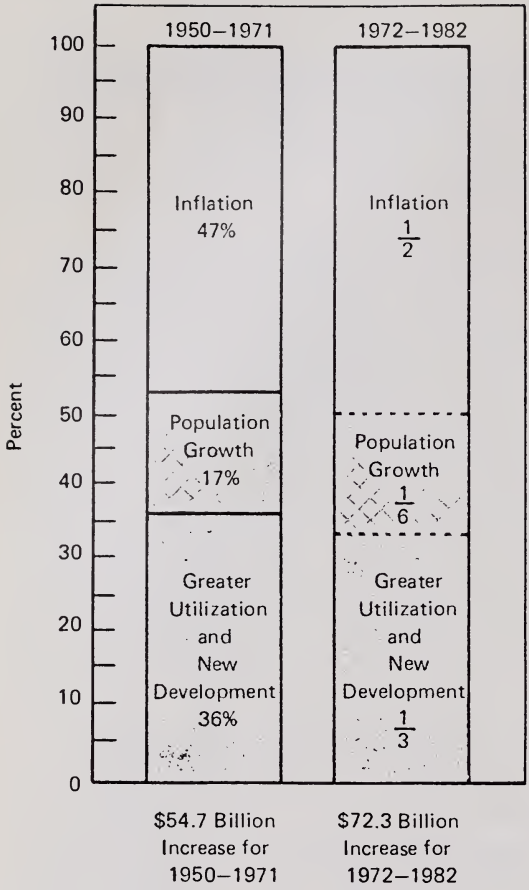
Sources: Social Security Administration, Dept. of Health, Education and Welfare, and Arthur D. Little, Inc., estimates.

Fig. 1. National health expenditures, 1950-1982.

tive to review some of the broad trends characterizing the market and contributing to opportunities for commercial products.

Figure 5 summarizes some of the trends in health care which we believe are important. While treatment of acute illness is still a major consideration for the physician, there are more demands now for treatment of chronic conditions and growing awareness and attention placed upon health care maintenance and preventive health care. There is also at the present time a small but growing interest in the attainment of "super health," a term coined to illustrate the desire to maintain the body in a youthful top form through the judicious use of exericse, special diet and nutrient supplement. In considering the changing focus on health care, we are well aware that infectious diseases are still prevalent but less often fatal. Such conditions require the longer use of antibiotics and other supportive therapy. Diseases of early infancy, rheumatic fever, and many communicable diseases such as tuberculosis, typhoid fever, dyphtheria, whooping cough and measles are less prevalent today thanks to improved sanitation and the use of vaccines. However, some communicable diseases such as venereal disease and hepatitis represent a growing problem. As a result there is a greater demand for detection testing and institution of corrective therapy.

Chronic conditions are now more widely treated. There are a larger num-



Sources: Social Security Administration, U.S. Dept. of Health, Education and Welfare, and Arthur D. Little, Inc., estimates.

Fig 2. Factors causing rise in personal health care expenditure, 1950-1982.

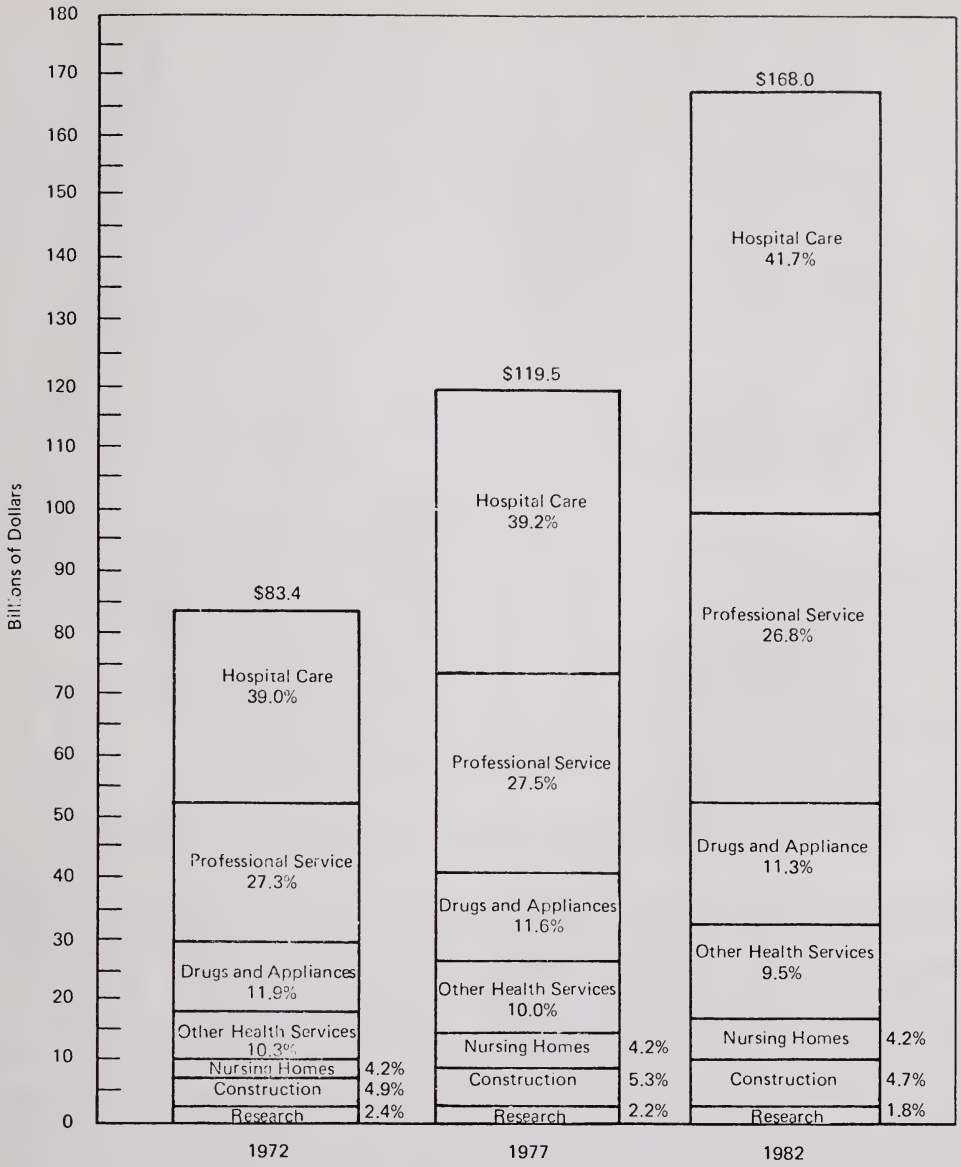
ber of diabetics who are enjoying a longer life span and who require continuing therapy. Similarly, more patients are now being diagnosed as having emphysema, as well as various cardiovascular problems. Such conditions are now responding more effectively to maintenance treatment in an attempt to arrest the progress of the disease. Additionally, problems which were not diagnosed as requiring medical attention are now receiving corrective treatment. These include mental illness, alcoholism and drug addiction.

These trends, the increasing attention to maintenance therapy of conditions such as hypertension, arthritis, Parkinsonism, and the growing focus on preventive health care such as birth control or more recently the newer treatment of asthmatic conditions represent a departure from traditional approaches and more importantly are possible through the use of many of the health care products.

Critical to the successful delivery of heath care are the resources available. In this respect a very important factor is the personnel required. There are more physicians in the United States today than in the past. This increase is not only in absolute numbers but also on a per capita basis. Moreover there is occurring an increasing usage of support personnel to utilize the physician's time more effectively. The ratio of physicians to nurses and other support personnel has changed from 1 to 6½ in 1960 to 1 to 8 in 1970; we predict that the ratio will reach 1 to 10 by 1982.

The increased use of supporting personnel is a positive factor. However, their availability is enhanced by the development of testing procedures which allow them to function more efficiently and the availability of suitable agents to make such support personnel effective members of the health care team.

A critical factor in the delivery of health care is the financing required. Figure 6 traces the increasing role of third-party payment for health care in the United States. As recently as 20 years ago, most individuals were paying two-thirds of their health care bill. But in the subsequent time period individual contribution has declined to roughly one-third with the remainder provided by third-party payments. This is an important change as the concentration in purchasing power is allowing the third-party payment factors to influence more



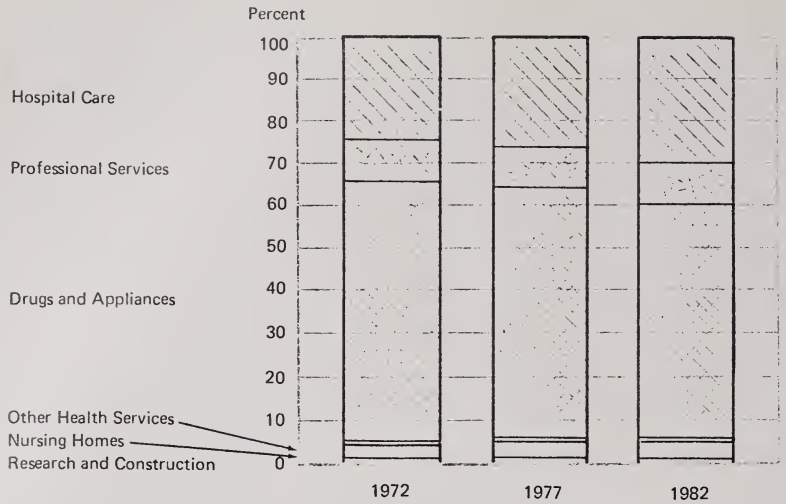
Source: Arthur D. Little, Inc., estimates.

Fig. 3. National health expenditures, 1972-1982 (billions of dollars).

actively and directly the type and quality of health care being delivered. Obviously it has a very dramatic impact on those companies providing products for use in health care as considerable pressure is placed upon the pricing level.

The national goal now appears to be a commitment to provide quality care for all at the lowest cost. While easily stated, this is a difficult target because of the confusion in defining both quality care and lowest cost. Nevertheless, it is important because it does provide a single objective in which various programs can be directed.

- We now have increasing government



Products as Percent of Total

	1972		1977		1982	
	Total	Products	Total	Products	Total	Products
Hospital Care	32.5	3.6	47.0	5.9	70.0	10.0
Professional Service	22.8	1.3	33.0	2.0	45.0	2.9
Drugs and Appliances	9.9	8.9	14.0	12.8	19.0	17.5
Other Health Services	8.6	0.2	12.0	0.3	16.0	0.4
Nursing Homes	3.5	0.3	5.0	0.6	7.0	0.9
Research and Construction	6.1	0.2	8.5	0.3	11.0	0.4
Total	83.4	14.5	119.5	21.9	168.0	32.1

1. Excludes food, furniture, and non-medical hardware; textiles; paper, photo, and maintenance products.

Source: Arthur D. Little, Inc.

Fig. 4. Markets for Health Care Products—1972-1982 (billions of dollars).

involvement, certainly because of financing but also through regulatory powers.

- We are moving toward peer review with more objectivity in the evaluation of treatment and greater consideration as to what is the optimum/adequate treatment required.
- We are now entering the era of cost effectiveness reviews in which the diagnosis and treatment are being measured by the cost involved.
- Because of the increase in third-party payments, there is now more pressure for consolidation of resources, facilities and programs. Many of the overlaps encountered in the past are being corrected. The system, while far from perfect, is moving in a more orderly direction.
- As a result we are seeing increased pressures on the marketing of products used in health care with distribution changes taking place in response to the new buying influence.
- There is a growing selectivity in the evaluation and use of products. Products are now selected on a basis that they must fill a real need, but importantly technologically superior products are being valued.

Thus to summarize, we believe that there are a number of key factors influencing commercial opportunities but that these factors represent a positive environment for exploitation in selected areas. Areas we consider of prime interest are pharmaceuticals, clinical laboratory diagnostics, and electronic biomedical instrumentation.

The sale of pharmaceuticals represents

the largest sector of products used in health care. Table 1 projects the sales of important classes of ethical (prescription) products. Antibiotics, including penicillin and broad-spectrum products, are the largest category, but we believe that mental health drugs will become the most widely used class by 1975.

MARKET TRENDS IN PHARMACEUTICALS

The major trends in ethical pharmaceuticals are shown in Table 2. A large portion of the U.S. population is receiving drug therapy on a continuing basis. Increasing emphasis is being placed on long-term drug therapy, including the treatment of such conditions as arthritis, glaucoma, diabetes, emphysema, psoriasis, bronchitis, asthma, and drugs for the mental health and cardiovascular areas. Nonetheless, there is a continuing need for antibiotics that are effective to treat acute infection. Many causative organisms have become resistant to available antibiotics and other organisms possess an R factor which provides resistance to antibiotics even if the individual had not been treated with that particular antibiotic in the past. The success of Lilly with cephalosporin antibiotics and Schering with Garamycin illustrates the market opportunity for a significant new antibiotic.

The government has assembled teams and is providing the budget to spearhead drives in the areas of cancer, cardiovascular disease and mental health. An

TABLE 1
Sales of Ethical Pharmaceuticals, 1970-1980
(millions of dollars)

	1970	1975	1980
TOTAL	5,200	8.200	12,000
Antibiotics	725	1,050	1,500
Mental Health Drugs	610	1,100	1,800
Hormones	450	690	1,000
Cardiovascular Agents	325	530	800
Analgesics	275	440	650
Diuretics	175	270	400
Other	2,640	4,120	5,850

Source: Arthur D. Little, Inc.

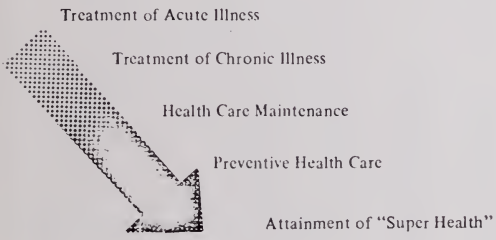
TABLE 2
Ethical Pharmaceutical Market Trends

- More Emphasis on Long-term Drug Therapy
- Increasing Focus on Cancer, Cardiovascular and Mental Health
- Greater Use of Prophylactic Therapy
- More Critical Attention to Cost/Benefit Ratio
- More Emphasis on Drug Delivery Systems

Source: Arthur D. Little, Inc.

	1960	1970	1972	1982
Per Capita Expenditures	143	328	400	720

Health Care Spectrum



Changing Focus of Health Care

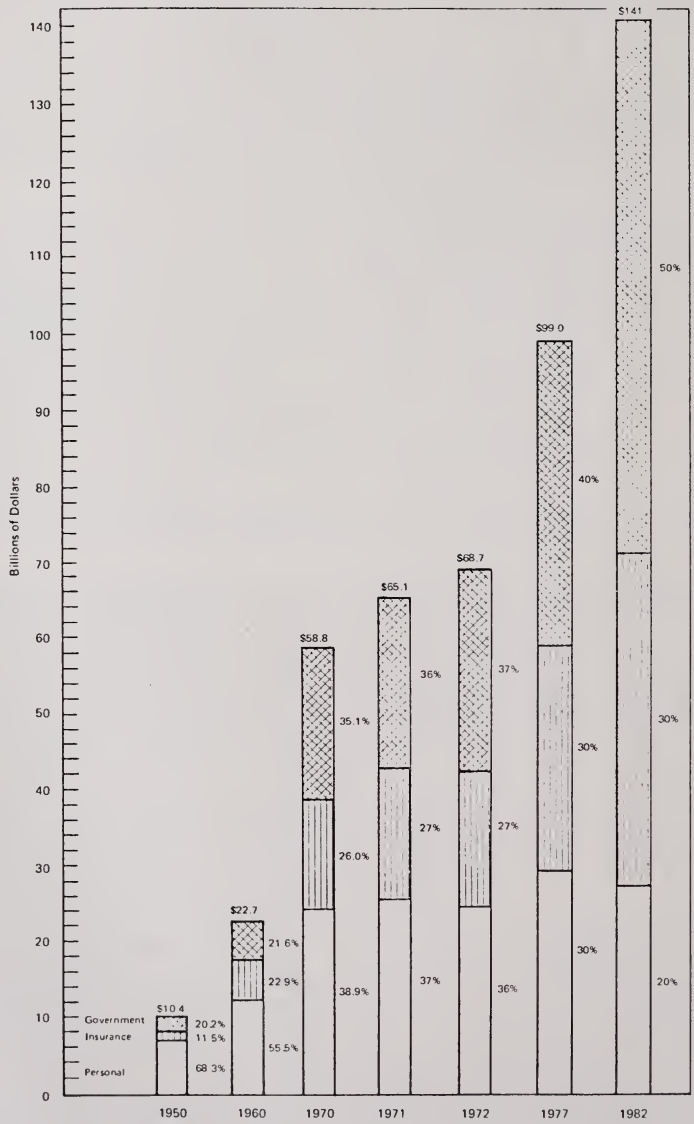
- Infectious diseases still prevalent but less often fatal.
- Diseases of early infancy, rheumatic fever, and many communicable diseases – tuberculosis, typhoid fever, diphtheria, whooping cough, measles – are less prevalent.
- Some communicable diseases – venereal disease, hepatitis, salmonellosis – a growing problem.
- Chronic conditions now more widely treated – diabetes, emphysema, cancer, arteriosclerotic heart disease, cirrhosis of liver.
- Some problems receiving more medical attention – mental illness, drug addiction, and alcoholism.
- Increasing attention to maintenance – hypertension, arthritis, ulcers, Parkinsonism – and increasing attention to preventive health care – birth control, preventive asthma treatment, common cold.

Source: Arthur D. Little, Inc.

Fig. 5. Health care overview.

important by-product of these activities is the information being made available on the role of various chemicals and their effect on the biochemical equilibrium in the disease state. This information is most valuable in conjunction with information about the biochemistry of the healthy state, which is also being provided in the controlled study. The major government programs in these three areas should provide more information to allow the development of specific drug products to treat a variety of conditions.

The commercialization of oral contraceptives in the 1960s heralded a trend to greater use of prophylactic therapy. We expect antivirals and agents to treat



Sources: *Social Security Administration Bulletin,* January 1972, and Arthur D. Little, Inc., estimates.

Fig. 6. Financing personal health care.

asthma will also be used in preventive medicine.

The growth of third-party payment has focused attention on the cost/benefit ratio of pharmaceuticals. Drug products have received a great deal of scrutiny from congressional and consumer sources, which tend to urge the greater use of generics or the establishment of a National Formulary in which the effectiveness of the drugs could be compared to their cost. We expect the trend towards more severe evaluation of the cost of pharmaceuticals and to the patient's need to result in greater use of many older drugs, but we also believe that opportunities exist for producers to tailor old products to provide new services.

The increasing emphasis on drug delivery systems—to ensure that the desired amount of the drug is made available at the proper time at the proper place within the body—is directed toward minimizing side effects associated with many drug products. Since many chemicals are changed in the body in some way, a large dose is frequently prescribed to ensure that the desired amount will be available when needed. By developing more effective delivery systems, firms are attempting to lower the amount of active ingredient needed.

MARKET OPPORTUNITIES IN PHARMACEUTICALS

A firm can attempt to exploit some of the trends identified above in a number of ways, as shown in Table 3. Development of a new drug is expensive and time consuming, but can be highly profitable. Small firms that have pursued this route include Unimed with the development of Serc in the mid-1960s, Calbiochem, which is investigating a specialty biochemical that appears to be effective in treating psoriasis, and Newport Pharmaceutical's review of an antiviral. A related approach is to modify an existing pharmaceutical and to improve its action. Examples include the many variations of the thiazide molecule used as diuretics and the number of modified penicillins in use. More recently, prostaglandins have been of extreme interest and a number of analogs are currently under investigation for specific actions.

TABLE 3
Ethical Pharmaceutical Market Opportunities

- Develop Own Drug
- License Other Company's Development
- Develop Carrier or Delivery System for Standard Drug
- Develop Strong Regional Position
- Engage in Joint Venture
- ,Emphasize Strong Marketing Skills

Source: Arthur D. Little, Inc.

Licensing of another company's development is a frequently used method of entry. For example, Syntex, which had made many breakthroughs in the hormone field, recently licensed Fisons' drug, Intal, which is of value in treating asthma, and introduced it to the U.S. market in 1973.

Some companies have succeeded in developing a delivery system to enhance the value of a standard drug. Alza, for instance, is incorporating standardized drugs in a microenvelope to treat various ophthalmic conditions. By varying the composition of the envelope, Alza can allow the drug to stay in contact with the eye for varying lengths of time.

Other firms have become successful by concentrating on regional activity, electing not to dilute their strength by a national marketing campaign. For example, a small company in the New England area, Moran Pharmaceuticals, successfully sells a line of standard pediatric pharmaceuticals and obtains a larger market share in many localities

than some of the national branded products.

Others have recognized the value in combining the resources of different firms. For example, FMC, a large company with strong skills in chemical technology, had developed a process for modifying natural polymers. When some of these materials were found to have interesting medical properties, FMC joined with Alcon Laboratories, which possesses strong marketing competence for specialty pharmaceuticals, to form a joint venture (Avicon) to develop the potential of some of the products.

Finally, some firms have been successful in developing very strong marketing competence in order to compete quite successfully in a limited number of product areas. Marion Laboratories is an outstanding example of this type of firm.

CLINICAL LABORATORY DIAGNOSTICS

The clinical laboratory diagnostics market comprises the instrumentation, reagents and supplies sold to clinical laboratories (sections of hospitals or independent facilities that analyze samples taken from the patients). Functional units of the clinical laboratory include biochemistry, hematology, microbiology, urinalysis, serology, cytology, bloodbanking, histology and pathology. (We do not include radiology or nuclear medicine in the following discussion.)

The cost to patients or to third parties for the services of all clinical laboratories currently approaches $6 billion annually. We estimate that this will increase to $17 billion by 1980. Almost 75% is payments to hospitals; sales by independent clinical laboratories are about $1.6 billion. Sales of instruments, reagents, and other products used in clinical laboratories amounted to $715 million in 1970 as shown in Table 4.

TABLE 4
Sales of Clinical Laboratory Diagnostic Products, 1970-1980
(millions of dollars)

	1970	1975	1980
TOTAL	715	1410	2410
Instruments	225	400	630
Automated Equipment	75	140	240
Specialized Clinical Instrum.	45	100	170
Other	105	160	220
Reagents	275	630	1160
Automated Chemistry Reagents	30	85	140
Reagent Kits	70	170	350
Enzymes	30	75	120
Biological Reagents	85	190	400
Other	60	110	150
Other	215	380	620

Source: Arthur D. Little, Inc.

The use of automated analytical equipment has grown rapidly in the biochemical laboratory, and other departments such as microbiology, serology and bloodbanking offer good prospects for increased use of automated equipment. Also, we expect specialized instruments, many of which have been used as research tools, to be modified to meet everyday laboratory needs. Electrophoresis, for instance, is changing from a strictly research technique to a routine practice.

We believe that reagents will show especially strong growth as more expensive and exotic reagents are developed and are increasingly used in the high-volume automated equipment already in place. We expect automated chemistry reagents to grow dramatically from their small 1970 level, although intense competition has depressed unit prices somewhat. Reagent kits and enzymes are both showing rapid growth as more specialized tests are required by physicians and as new tests are invented and become part of the daily practice of the clinical

laboratory. Biological reagents, which include immunological reagents and bloodbanking reagents, are also showing high growth as more exotic tests are called for. The use of highly systematized reagent kits in the physician's office has been postulated by some to be an attractive area for the future, but we expect medical, political and quality control concerns to moderate the growth of this specialized market.

Divisions of many of the larger companies, such as Beckman Instruments, Baxter Laboratories and American Hospital Supply have positions in the clinical instrumentation market. Among the manufacturers of automated equipment, Technicon is the outstanding success story, while smaller companies such as Hycel are promising in terms of future growth. In specialized clinical instruments, Instrumentation Laboratory dominates the market in blood gas analysis. Gelman Instrument and Helena Laboratories are trying to grow through the increased use of electrophoresis in the clinical laboratory; their future success will depend upon the increasing adoption of this technique and the increasingly competitive nature of the field. Another small company that provides a potential growth opportunity is Orion Research, whose specific-ion electrodes are applicable in the clinical laboratory as well as in water pollution and research. In all of the instrument market segments, many inventors and entrepreneurs are trying to obtain funding for devices currently on the drawing board, but in most cases it is too early to be able to render a general judgement concerning their potential.

Sales of reagents for automated analyzers are dominated by Technicon, American Hospital Supply and Baxter Laboratories. Many companies that sell these reagents at the local level, e.g., Medical Chemical in California, are growing rapidly as a result of their involvement also exclusively in their business. The large number of manufacturers of reagent kits range from divisions of large pharmaceutical companies such as Miles and Pfizer to small, growing organizations such as Oxford Laboratories, Sigma Chemical and Calbiochem. Fewer companies manufacture enzymes. Some enzyme material is imported from Japan and others are by-products of the brewing and other industries. Worthington Biochemicals, which is solely in the enzyme business, has recently grown as the result of its involvement in diagnostic reagents. The biological reagents area is also specialized in that the raw materials are often in limited supply. Thus, Johnson & Johnson dominates the bloodbanking reagent field, while the small firm of Kallestad Laboratories is developing a significant reputation in immunological reagents.

TABLE 5
Clinical Laboratory Diagnostic Market Trends

- More and Earlier Diagnosis
- Expansion of Health Maintenance Activities
- Newer Tests to Detect More Abnormalities
- More Laboratories and More Tests Per Laboratory
- Improvements in Data Access
- New Technological and Packaging Developments

Source: Arthur D. Little, Inc.

MARKET TRENDS IN DIAGNOSTICS

Table 5 lists some of the more important trends influencing the diagnostics market. More and earlier diagnosis is being encouraged by physicians who are using the data in a more routine fashion, by patients who are alert to the value of periodic readings, the growth of health maintenance programs, and the inclusion of routine tests in union contracts. Adding to this demand is the

use of newer tests to detect more abnormalities. For example, work in the testing of blood chemistry may be useful as a diagnostic tool in predicting cancer and arthritis. The growing demand for tests has led to increases in both the number of laboratories and the number of tests being carried out per laboratory.

Another trend is to get the results faster and more accurately so that the physician or paramedical people will have earlier access to the data. Also, technological developments in the stabilization of certain key chemicals, aided by more sophisticated packaging, has enabled new kits to be developed, so that the reagents are available for use by the technician quickly in a premeasured dosage form.

MARKET OPPORTUNITIES IN DIAGNOSTICS

Judging from the past rate of introduction of new concepts in diagnostics, we expect products based on new principles to be on the market in a relatively short time. Table 6 lists the major areas in which we expect developments to occur.

Electrophoresis, until recently a research technique, now has wide application in the determination of isoenzyme profiles as well as in lipo-protein sensitizing. The use of electrophoresis should grow enormously, and with it instrumentation to decrease the labor component of this procedure. We expect other important research analytical techniques, such as think layer and gas chromatography, fluorometry, atomic absorption and possibly mass spectrometry, to be applied in clinical laboratories, especially in view of the increasing interest in toxicology. The use of new ion-specific electrodes may replace many existing methods of determination as well.

TABLE 6
Clinical Laboratory Diagnostic Market Opportunities

- New Automated Equipment
- New Clinical Techniques
- New Reagent Products and Packaging
- New Enzyme Applications

Source: Arthur D. Little, Inc.

We also anticipate further proliferation of new packaged reagents to enable technicians to perform what were previously exotic tests. New ways to stabilize enzymes and new reaction chemistries are making possible kits involving single-step additions and colorimetric readouts. In some cases kits with special readouts, such as luminescence biometry, have been developed. These kits have already led to an upsurge in enzyme testing.

Technological innovation in the clinical laboratory over the past decade originated in the biochemistry laboratory. The variety and volume of instruments and supplies have grown most rapidly in this area. From the original single-channel chemical analyzers based on both discrete and continuous-flow principles have grown multichannel instruments that allow discrete test selection from approximately a 20-test battery.

The hematology laboratory in the largest hospitals currently most nearly approaches the state of complete automation. The predominant determinations, white blood cell count and hemoglobin, can be performed rapidly by technicians. Automated equipment is also currently available for the determination of various coagulation (blood-clotting) values. The only major test still to be automated is the differential cell count, which is now one of the major tests (in total time consumed) in the clinical laboratory. An automated instrument to meet this need is currently being introduced, but additional experience will need to be gained before this test becomes automated on a large-scale basis.

The clinical microbiology area is ripe for new advances. Most of the work in this area has been performed in the same way since Pasteur, and the large labor component involved in carrying out these procedures should lead to rapid adoption of new techniques once they have been proven in clinical use. Simple devices such as automated diluters and petripourers have already been introduced for use in the isolation of individual bacterial colonies, and instruments have recently been introduced to count bacterial colonies into measure clearing zones to determine antibiotic activity in a continuous-flow system.

The increasing variety of tests handled by the immunology laboratory is opening many new opportunities. Adoption of the immunological determination of HCG (pregnancy) and rubella (German measles) and new mononucleosis tests have greatly increased the work in this laboratory above what was previously almost entirely the initial screening for syphilis. In the near future, we expect that cancer tests and improved arthritis tests as well as screening tests for rare diseases such as toxoplasmosis to be performed in this laboratory. Also, certain specific tests for biochemicals may be performed in the viral laboratories using immunological techniques.

Some innovation in serology procedures is needed to meet increased demands on personnel time. The rapid introduction of micro systems has reflected this need, and special automatic diluting systems will also aid in serology. Many serological tests may be made more quantitative through the use of radioisotopes. The availability of serological test kits should also increase greatly in the near future.

Instruments available in bloodbanking are designed mainly for grouping and typing of blood. Other instruments are available for automatically performing the washing involved in the Coombs test. However, the major effort of the bloodbanking laboratory, crossmatching, is not now automated. The clinicians in bloodbanking have the highest concern for quality control of any section of the clinical laboratory. While an improper chemical or hematology analysis may delay proper treatment of a patient, an incorrect crossmatching determination in the bloodbanking laboratory can lead to death on the operating table. For this reason, the bloodbanking laboratories have resisted attempts at innovation in their laboratories. We expect this resistance to decrease slowly. We expect technological innovation to provide combination grouping-typing-crossmatching instruments in the near future that will greatly decrease the technician's workload in bloodbanking.

The fields of histology and pathology are limited to the extent to which new technology is applicable, mainly because pathology as performed in hospitals is more of an art than a science. Automatic slide-staining instruments on histology have long been used in the histology lab, but we do not expect major advances in technique or procedure to occur here. Some individuals are currently talking of patent recognition devices or of instruments capable of detecting particular changes in tissue sections as a result of differential uptake of radioactively labelled or fluorescent stains, but we doubt that such innovation is likely in the near future.

Similar types of instruments are also proposed for application to cytology. The primary job of the cytology laboratory currently is the performance of the Pap test. Although a large staff is usually not required in this laboratory, conducting this test requires a skilled individual and is quite demanding. Attempts to automate this test have not yet been successful, but its automation is a distinct possibility for the future. Although urinalysis accounts for one of the largest

throughputs of patient samples in the clinical laboratory, its semiquantitative nature has not encouraged the introduction of automation. Most urine analyses utilize chemical-containing paper strips by which a large number of urinary characteristics can be determined by changes in color.

ELECTRONIC BIOMEDICAL INSTRUMENTATION

Biomedical instrumentation differs from laboratory diagnostics in that it involves direct measurements of the body. Some types of devices, such as X-ray equipment, have a long history of use while many are more recent and sophisticated developments, such as ultrasonic scanning. We treat diagnostic equipment and patient monitoring equipment, which is used in a diagnostic sense but on a continuing basis, as separate categories. In a third grouping we include therapeutic or prosthetic equipment, which we do not consider growth areas. Table 7 shows our estimates of sales of the various types of instrumentation through 1980.

The largest sector of the diagnostic equipment market is X-ray equipment. However, the use of this equipment is established, and we do not expect growth to be high over the decade.

We believe that other areas such as nuclear equipment have a strong growth potential. Clinical nuclear medicine deals with the application of radioisotopes to the diagnosis and treatment of disease. Diagnostic nuclear methods are developing rapidly, and organ imaging to evaluate the position, size, structure and functional capacity of internal organs without injury to the patient is the largest and most rapidly expanding field in clinical nuclear medicine. A labelled agent designed to concentrate in a certain organ, e.g., brain, thyroid, lungs, bone, liver or spleen, is administered, and the region of interest is observed with a nuclear scanner or camera system, which shows the distribution of the isotope. This technique enables abnormal conditions to be detected early enough so that appropriate therapy can be initiated. We expect improvement in whole-body scanners and the development of imaging instruments with greater resolution and higher sensitivity

TABLE 7
Sales of Electronic Biomedical Instrumentation, 1970-1980
(millions of dollars)

	1970	1975	1980
TOTAL	360	583	892
Diagnostic	225	335	490
Nuclear Equipment	25	60	140
Electroencephalograph, Phonocardiograph & Vector Cardiograph	12.5	20	40
Ultrasonic Scanning	2.5	5	15
Other	185	250	295
Patient Monitoring	29	75	135
Coronary Care System	22	50	90
Respiratory System	1	11	20
Telemetry & Transducers	6	14	25
Other	106	173	267

Source: Arthur D. Little, Inc.

to result in strong growth for this area.

We believe that there will be strong growth in the electroencephalograph, phonocardiography and vector cardiograph markets. We believe electrocardiographs will have higher growth than X-ray equipment and their sales will increase as more general practicioners use this equipment as part of a standard annual physical, but they are already widely used, and we do not anticipate strong growth for these units. In contrast, the encephalograph, which measures the electrical potentials produced by the brain, is a complicated instrument and the results are not easy to interpret. Thus it is used mainly in hospitals rather than physicians' offices. If this equipment can be successfully interfaced with computers, we expect that sales will increase rapidly.

Ultrasonic scanners are of considerable interest to suppliers and practitioners. This instrument is used for displaying tissue/organ interfaces. Accepted uses are in electroencephalography, brain mid-line locations, location of nonmetallic fragments and abdominal scanning. There is considerable interest in this equipment for detecting cancer in soft tissues.

Patient monitoring equipment constitutes a relatively small market but one which we expect to grow rapidly. The range of instruments used in patient monitoring is large, as is the number of companies now active in supplying the market. Instruments such as electrocardiographs, heart-rate meters, pulse-rate meters, devices for the measurement of blood pressure, respiration-rate meters, temperature-sensing devices, and in some cases units for measuring blood gases are employed.

Two types of intensive care units exist in many large hospitals, the cardiac care units (CCU) and the operating and recovery rooms. Much of the instrumentation used in these facilities is the same. We believe that growth will be modest for the instruments earmarked for the operating and recovery rooms because the anesthesiologist now has sufficient equipment to meet current needs and the equipment is fairly new since its development is fairly recent. However, we expect substantial growth for instrumentation to be used in coronary care units. In these units, electrocardiograms are monitored to check the presence of arrhythmias and to measure pulse rate, heart rate, blood pressure, temperature and respiration rate. CCU instrumentation requires little sophisticated technology and firms can enter the market fairly easily. Success depends upon good market planning, a skilled sales force and the ability to service instruments on a 24-hour basis.

A relatively recent development has been the respiratory system set up for patient monitoring. Respiration-rate monitors can be bought as an integral part of the monitoring equipment or as plug-in units compatible with existing equipment.

Heart pacemakers, included in the "other" category, have had strong sales in the last four or five years, largely because of the increased reliability of the devices and the recognition by surgeons of the value of existing equipment. An important problem, however, concerns the power source used to drive the pacemakers. A patient on a pacemaker frequently has a life expectancy in excess of six years, but the battery used to drive the instrument lasts less than thirty months. Innovations in pacemaker design are concentrating heavily on the power source. Three types of power source are currently under active development: nuclear, electrochemical and electromechanical, in which the patient's body is used to power the device. We believe that growth in pacemakers will

be modest until some of the power source problem can be overcome.

MARKET TRENDS IN INSTRUMENTATION

Table 8 lists major trends in the electronic biomedical instrumentation market. Difficulty in communication between physicians and engineers has been a major problem in the past. Such communication is now becoming active and a continuing dialogue is developing between the various professions. Another important change is that physicians no longer regard biomedical instrumentation as a threat to their professional judgements and now generally recognize the contributions of instruments in allowing them to be more effective in diagnosis and treatment. A very important contribution to the acceptance of electronic equipment has been made by the FDA's more intense review of its safety in use. As problems have been corrected, the physicians have become more confident in their use of instrumentation. Also, physicians value the benefits afforded to the treatment schedule by instrumentation that makes possible an early and accurate diagnosis. Advances in technology have made possible a greater number of noninvasive techniques so that the risk or discomfort to the patient is minimal.

TABLE 8
Electronic Biomedical Instrumentation Market Trends

- More Exchange Between Engineering and Medical Groups
- Physician Attitude Changing from Hostility to Advocacy
- FDA Safety Requirements Encouraging Wider Use
- Prompt Treatment Possible Through Early Detection
- Non-invasive Techniques Promoting Greater Use

Source: Arthur D. Little, Inc.

TABLE 9
Electronic Biomedical Instrumentation Market Opportunities

- Application of Engineering to Biological Analysis
- Combination of Medical and Electronic Capabilities
- Requirement for 24-Hour-a-Day Service Coverage (may favor small regional firm)
- Development of Error-proof Systems

Source: Arthur D. Little, Inc.

MARKET OPPORTUNITIES IN INSTRUMENTATION

Some of the requirements that present opportunities in biomedical instrumentation are identified in Table 9. Market development has been held back less by lack of advances in technology than by the inability of physicians to digest all of the advances. A successful development should be highly tailored to fit the needs of the medical community and information about the advances in instrumentation related to a physician's interests should be provided at a rate he can absorb. Good growth is most likely to occur when a development is backed by a strong combination of medical and electronic capabilities. Some firms have set up a cooperative program in which a pharmaceutical activity with strength in clinical practice and knowledge of physicians' needs are joined with units having strong skills in electronic engineering.

The ease of entry by new competitors in biomedical instrumentation has been a major problem for many firms. Protection is minimal, as hardware ideas can be quickly copied. There is relatively little difficulty in starting a small company to service a local market but a great deal of difficulty in trying to establish a national marketing network. A critical factor in

the success of many firms has been the establishment of a strong distribution system that can provide service requirements on a 24-hour-a-day, seven-days-a-week basis.

A frequently overlooked aspect is the training of individuals who are to use the equipment. For example, many firms have highly sophisticated programs to educate physicians in the use of instrumentation, but neglect the training required for technicians or nurses.

Industry has been criticized for abandoning leadership in biomedical engineering research to university and government labs, but it is limited in large measure by the fragmented market and the lack of precise definition of market needs. Also, certain devices, while highly desirable, are needed in small quantities, which inhibits strong industrial interest.

Leading participants include international firms, such as Siemens and Philips as well as U.S. giants such as Raytheon, RCA, and Hewlett-Packard. Many small firms also participate successfully. For example, Nuclear Chicago (now a division of G.D. Searle), Ohio Nuclear, and Canberra Industries have participated in the nuclear medicine sector very aggressively, and Metrix and Holosonics have been quite active in the scanner market. Other small firms such as Ithaco, Lexington Instruments, Burdick, and Mennen-Greatbatch distribute a full line of biomedical instrumentation. Thus, we see in this area a highly fragmented market, but one which has strong stimulus for growth and offers substantial reward to those who are able to participate effectively.

1875: Birthday Honors for Claude P. Brown, M.D.

By KATHARINE R. STURGIS, M.D.

On October 24, 1973, Claude P. Brown, M.D., of 1930 Chestnut Street, Philadelphia, oldest living Fellow of The College of Physicians of Philadelphia, celebrated his 98th birthday.

At the reception and banquet given in her honor in 1972, President Katharine R. Sturgis saw to it that a birthday cake was presented to Dr. Brown for his 97th birthday. Of the 98th birthday party, Dr. Sturgis wrote to the Fellows: "Our Senior Fellows continue to amaze me. Sam and I attended Claude Brown's 98th birthday dinner. Claude was an alert and witty host."

The following remarks about the year 1875, when Dr. Brown was born, and about his birthplace, Mahanoy City, Pennsylvania, were made by Katharine R. Sturgis.

Mahanoy City, Pennsylvania. Turbulent times! Building of the railroad tunnel through the Broad Mountain had resulted in violence a few years earlier. Railroading and anthracite mining were bringing to the region enterprising operators and hopeful workers. Population of the township in 1860 was only 573, but the town itself had 5533 inhabitants by 1870. Clashes occurred every step of the way. Riot, bloodshed and murder were commonplace. Mahanoy City was a center of the most difficult growing pains of the entire anthracite region. Much of the conflict related to Irish workers who had begun to migrate to the area following the disastrous potato famine of 1848 and their rejection by mine bosses who were mainly English and Welsh. Rather than hire the Irish, they imported Central European workmen who soon competed for a living. The result was murder, which was at first sporadic but later at least partially organized by the notorious Molly Maguires. Strikes were violent and bitter and progress seemed almost impossible in such an atmosphere. However, the decade 1865-75 led to much prosperity for the borough, which was incorporated in 1863. Veterans of the Civil War were conspicuous in the period. Businessmen bore mainly English and German names.

Among the incidents of 1875 was the disastrous riot of June 3 in which Sheriff Warner read the riot act and Pennsylvania National Guardsmen from Pottsville, Harrisburg and Wrightsville were called in and remained for several days. Bloody Saturday occurred August 14 after a long strike when the miners were finally paid for the first time and drunken fighting resulted. In the same year, Franklin B. Gowan, president of the Philadelphia and Reading Coal and Iron Company presented a list of outrages including fires, train wreckings, murders and attacks, purportedly the work of the Molly Maguires. A year earlier one of the numerous casualties of a general fight in the streets was Chief Burgess George Major.

There were signs of progress, too. In 1875, after much agitation by the citizens, the Gas Company contracted to supply gas for street lamps and 22 were erected. The same year Borough Council requested the governor to recognize the organization of a military company under state laws "in view of the riotous conditions of affairs of the borough." The Silliman Guards, which later became

a unit of the Pennsylvania National Guard, were organized. In 1877 it became necessary to guard against mine damage to the town, and a citizens' committee was organized to obtain an injunction "restraining responsible parties from further undermining of the town."

Mary McHugh, one of the earliest teachers in the log schoolhouse in the early 1860s, began teaching at age 13. The high school graduating class of 1876 consisted of seven graduates, although the population of the town at the time was in excess of 5600. Since many boys began working in the collieries at age 8 or 9, a Working Boys' Day School and a Night School were soon organized to improve their lot.

Coal and beer were the important products which had to be marketed. Transition from canal to railroad transportation greatly increased flexibility of marketing but brought with it many of the complexities which marked the era not only in the coal regions of Pennsylvania but also as a part of the development of industry generally. A total of approximately 50 collieries were in operation in the region of Mahanoy City at its peak production of anthracite, beginning with six in the 1860s and ending about 1960 when the last one closed.

It is difficult to visualize a more unsettled time or place in which to begin life but such was the setting for the arrival of Dr. Claude Brown.

Milan, Italy. Emperor William I will leave Milan to return to Germany.

London. Reports are in circulation that Prince Bismarck will resign because of ill health.

Port Said. Her Brittanic Majesty's Ship *Serapis* with the Prince of Wales and suite aboard en route for India has arrived here.

Washington, D.C. President Grant visited friends in Baltimore the weekend of October 23-24.

The *Sunday Dispatch* complains that the decisions of the Internal Revenue Department, since Delano has been in office, have been in many instances "ineffably absurd."

Brooklyn, N.Y. Moody and Sanky began revival services in Brooklyn. 10,000 attended in the morning, again in the afternoon, and 5000 were turned away.

Richmond, Va. The funeral of General George E. Pickett was under way. The statue of General Stonewall Jackson was to be unveiled on October 26 with the grandest pageantry ever witnessed in Richmond.

Philadelphia, Pa. Plans were under way for the 1876 centennial. Inspections by officials were frequent and controversies the rule.

The Charlie Ross abduction case continued to be front page news. Having occurred July 1, 1874, many clues and reports were being received and would continue for many years. The current story claimed that the boy was in England, and instructions were given for intermediaries to make contact.

Complaints were being aired about conditions at Girard College.

Of unusual interest was the appearance in behalf of local Republican candidates for office of Judge Alfonso Taft, of Ohio, who spoke at the Opera House, Germantown and Chelten Avenues. Judge Taft had recently lost the nomination for the Ohio Governorship to Rutherford B. Hayes.

At Pennsylvania Hospital there were numerous admissions for injuries including horse kickings, burns and one finger lost in a hay cutter.

There was a review of the Schuylkill Navy at Fairmount.

Henry V or *The Battle of Agincourt* was playing at the Walnut Street Theatre with Mr. George Rignold in the title role. Reviews were good.

W. Paine, A.M., M.D., professor of the principles and practice of medicine in the Philadelphia University of Medicine and Surgery and physician to the University Hospital . . . "has invented a new, original and ingenious method of propagating all forms of the germs of disease; so that every malady affecting the human family can be reproduced and its essence demonstrated. He has also discovered substances that will neutralize and destroy these germs." Four lectures were advertised. Admission was $.50 at the New Hall of the College Building, 9th Street south of Locust.

Weather was reported as clear over New York, cloudy over Washington, foggy over Boston and over Philadelphia—smoky. The temperature was 56° on October 24, 1875.

The *Public Ledger*, Monday, October 25, carries the following coincidental story: "An incendiary fire at Mahanoy Plane in Schuylkill County at 2 o'clock yesterday A.M. destroyed 8 stores, including Kirlin's drug store which contained the telegraph and post office. The loss is about $30,000. The mail matter and telegraph instruments were saved. A number of other articles were stolen during the fire and one of the thieves was arrested. There is no clue to the incendiaries."

A Short History of Postgraduate or Continuing Medical Education in the United States[1]

By JEROME J. HARRIS, Ph.D.[2]

Although I am affiliated with a major pharmaceutical company, I have a special interest in the history of communication as it relates to medicine.

The field of postgraduate or continuing medical education has drawn my particular attention for a number of years, since for the most part, it parallels the chronological development of communication methods in general. The medical profession was quick to adapt and adopt the new techniques to their needs.

For example, surgeons were among the first to appreciate the potential of motion pictures for visualizing and demonstrating procedures which are difficult to communicate verbally. A French surgeon, Eugune Doyen, applied motion pictures for teaching when he exhibited a film on "Craniotomy" at the Edinburgh meeting of the British Medical Association in 1898. Films, he pointed out, could explain to thousands what a demonstration could do for only a few students standing around an instructor. Judging from the many films shown at national medical meetings today, there is no question that Doyen was right.

However, there is always the danger that either new methods of communication will be introduced by overenthusiasts who make wild predictions as to their potential or will be held back by those tradition-bound for whom status-quo is both a religion and a rigid code of conduct. For example, soon after World War II, the American Medical Association conducted a survey on medical education. In answer to the question: "What new teaching methods have you adopted in the past few years?", one medical educator replied, "We have tried Hippocrates and found him good." Another, when asked about medical television, replied, "I am unfamiliar with closed-circuit television and I hope to remain so."

Somewhere in between these two extremes lies the road to progress.

The idea of continuing education is certainly not a new concept in medicine. As early as 1898, a court pointed out that physicians have a duty to keep up with medical developments and advances.

This rule is particularly applied to specialists where the courts feel a patient consults a specialist because he assumes the specialist is more aware of recent developments.

Continuing or postgraduate medical education is the period of continued study where physicians maintain their competence. In contrast to the undergraduate and graduate phases, it is informal and highly individualized with the physicians determining the type and extent of their educational activities.

No week passes without the postman delivering notice about courses available somewhere. Journals publish lists. Insurance companies, foundations and pharmaceutical manufacturers offer programmed texts and other materials in

[1] Section on Medical History, The College of Physicians of Philadelphia, 26 November 1973.

[2] Director, Medical Communications, Schering Corporation, Galloping Hill Road, Kenilworth, New Jersey 07033.

postgraduate medical education. And yet, with all the courses and materials available, postgraduate education for the medical practitioner is still fragmented.

Therapeutics was fairly simple and straightforward for the physician until 1940. The advent of the so-called "miracle drugs" changed things drastically and medical schools geared themselves to the new drugs, methods and technologies.

As a matter of fact, the U.S. physician today has a therapeutic arsenal of some 1,200 different drugs, exclusive of some 6,000 combinations. About 70% of these drugs were either unknown or unavailable 15 years ago when more than one half of today's practicing M.D.'s were taking pharmacology in medical school.

With the above as prologue, the question arises: Is it possible for a productive physician to keep abreast of new developments and a medical literature that doubles in size every fifteen years and shows evidence of continued growth?

I believe it is no longer possible even in a specialty field such as dermatology. I feel safe in assuming no one here has attempted to digest all the articles cited in each issue of the monthly *Index of Dermatology*, published with the cooperation of the National Library of Medicine. In fact, to read an entire year's scientific publications would take half a century, if you're an average reader. To accomplish this feat, you would have to read 24 hours a day, seven days a week.

Surveys attempting to evaluate physician postgraduate acquisition of information and education have been supported by pharmaceutical companies, medical journals, and a variety of publications and interested concerns. The amount and type of medical journals read, refresher or postgraduate courses attended, attention to detailmen, direct-mail promotion, attendance at conventions and society meetings, discussions with colleagues, and use of radio, recordings or television are among the many methods that have been examined.

SURVEY OF STUDIES

An analysis of major studies 1940-1969-1973 reveals that physicians acquire most of their information from detailmen, journals, direct-mail, and colleagues, rather than through formal educational sources. A comprehensive survey in 1955 by Vollan on the scope of postgraduate medical education in the United States was very extensive and despite its 20 years the results are still applicable today.

According to Vollan:

There are five types of activities which physicians use to continue their education: 1., Reading of medical books, monographs, periodicals, and the literature physicians receive from pharmaceutical firms; 2., Professional contacts between the physician and his colleagues, med. reps., consultants and pharmacists; 3., Attendance at hospital meetings, such as staff clinocopathological and radiological conferences, and journal club meetings; 4., Attendance at national, state and local society meetings; and 5., Attendance at formal postgraduate courses.

Activities, such as research, patient study, teaching, preparation of medical articles, and visits to medical centers, were not included nor has the role of the 50,000,000 patients on the prescribing habits of the 300,000 physicians been examined.

The most recent AMA survey on obtaining new drug information (June, 1973) shows that today's physicians differ only in emphasis from Vollan's survey of 1955.

READING AS A SOURCE OF INFORMATION

According to Vollan, every conscientious physician maintains a library of

basic medical books for ready reference, supplemented by new monographs and texts or by use of a public, medical school or hospital library. There are some 22 or more medical publishers.

PERIODICALS

While acknowledging the difficulty of defining what a medical periodical is, Dr. Cummings, Director of the National Library of Medicine, believes there are more than 50,000 scientific journals publishing more than 2,000,000 articles annually and that there must be at least 5,000 (1,500 in the United States) substantive biomedical journals in a current total of 18,000 known to the 5,000 medical libraries in the United States.

TYPES OF JOURNALS

The journals vary in emphasis, content, and circulation; there are: *mass-circulation medical journals* with (free) or paid circulation of 130,000 to 200,000. *Medical Economics*, *Modern Medicine*, (abstracts from over 500 medical publications), *Current Medical Digest*, and *J.A.M.A.* are typical.

Non-specialty journals with a circulation of 25,000 to 75,000. Typical are the *New England Journal of Medicine* and *Postgraduate Medicine. State, and regional journals; county and city bulletins; allied professions journals* include osteopathy, med. educ., nursing, pharmacy, dentistry, hospital administration and finally, "*policy journals*," published for political or promotional purposes.

National journals such as *J.A.M.A.* usually present contributions in research, abstracts of articles from American and foreign periodicals; current medical and scientific news; experimental aspects of medicine; A question and answer or correspondence section; book reviews; and reactions to medical meetings, medical advertisements, obituaries and case studies.

Members of the AMA also receive one of ten specialty journals, i.e., *Archives of Dermatology*, *Archives of General Psychiatry*, *Archives of Internal Medicine*, etc.

Most recently, a series of *specialty digest journals* have appeared. Some of these digests also include original articles, book reviews, announcements, and new drug and legal sections.

Other specialized journals, *Medical World News*, a free biweekly magazine, with a format similar to *Time*, attempts to cover items of specific interest to physicians; financial journals, hobbies, sports and *Physicians World*, a new journal (Oct., 1973) (covering contemporary life in a changing environment).

Another so-called informative or educational source is the journal advertisement. Unlike "lay" journal advertising, journal advertisements must pass muster before the FDA and the journal's editorial board prior to being published. Some "surveys seem to indicate that medical journals are, in many instances, the leading factor in bringing knowledge of products to physicians and convincing them to prescribe such products."

There are also the widely circulated tabloid-type medical newspapers such as *Medical Tribune* and the *AMA News*.

ORAL SOURCES OF INFORMATION

An important oral source of information for a physician is his colleagues.

". . . The bedside consultation with a specialist is probably one of the most effective educative situations to which the practicing physician is exposed . . . Informal discussions with colleagues, in hospital cloakrooms and corridors and with the corner druggist also add to his education." (Vollan)

In 1959 Coleman, Menzel, and Katz studied the sociological factors involved in a physician's adoption of a new drug. They found that "doctors who share offices introduce the drugs an average of two and three-tenths months sooner than their colleagues who practice alone."

Ferber and Wales in a 1958 study found that detailmen, in addition to journals, etc. constitute a principal source of physicians' knowledge of pharmaceuticals.

A 1958 AMA survey of 157,000 physicians indicated that 64% of these physicians saw all the detailmen who called on them while 11 per cent refused to see any.

According to Vollan, "The representatives of pharmaceutical firms enjoy an ideal pedagogical situation in their interviews with physicians."

MEETINGS, CONVENTIONS AND EXHIBITS

Attending medical meetings is another way in which physicians keep abreast of new developments. As members of medical societies, physicians are requested to attend meetings (national, state and county). They range from two to five days.

Many pharmaceutical companies help defray some of the costs of various scientific assemblies and symposia either through advertising, participation, travel expenses to lecturers, or anonymous donations. Moreover, some companies may help subsidize national and state conventions through television programs or films (Schering; Smith, Kline and French; Merck, Sharp & Dohme; Squibb; and A. H. Robins), while others offer assistance in radio seminars or telephonic symposia. Lederle's "teleposia" permits teacher-clinical discussions in one or more hospitals with audience participation via questions to the moderator in each hospital. Still other companies have made clinical or telephone recordings on various medical subjects for physicians.

Commercial source reference manuals, like those published by Schering and Pfizer, and magazines or house organs such as Parke Davis' Therapeutic Notes, also serve as educational matter. A few companies have even gone into publishing. The *Merck Manual and Index* and the *Ciba Foundation Books* are typical.

DIRECT MAIL

Direct mail is considered an influential means for providing the physician with continuing medical education. These may include letters, house organs, brochures, reprints, periodicals, announcements, medical newspapers, hardcover books providing comprehensive reviews of drugs, and samples of drugs accompanied by literature.

HOSPITALS

Among other types of meetings are the non-organizational local hospital meetings which are usually attended for accreditation, but often deal with administrative matters rather than medicine. The average physician sometimes finds the larger teaching hospitals conferences too technical or specialized. In addition, smaller conferences and symposia, also frequently underwritten by pharmaceutical firms, are held on particular diseases or therapies but are not broad enough to serve as refresher courses.

FORMAL POSTGRADUATE EDUCATION HAD ITS TRUE BEGINNINGS IN THE LATE 1930s AND EARLY 1940s

Actual figures on physicians taking postgraduate medical courses can only be estimated since no formal examina-

tion of attendance has yet been made. In general, half the courses have been designed for specialists and half for general practitioners or both. Courses are offered by medical schools, national medical organizations, hospitals, state, county and local societies. Physicians can learn of the formal courses offered (including hours and locales) for postgraduate medical education by reading the annual (usually mid-August) continuing medical education issue of J.A.M.A.

According to estimated attendance figures in the listing, the most popular courses are those from one to three days, and the most preferable are "didactic" where the student plays a passive role in the learning process by listening and observing, i.e., Direct—lectures, panel discussions, demonstrations; or Indirect—tapes, television, radio, telephone, recording). The greatest interest apparently lies in general review or refresher courses. This still agrees with a 1962 survey made by Parke, Davis & Co.

Of the 697 institutions, hospitals, and societies offering courses, 32 used some television in their courses (127 of the 2,441 courses). Despite this large number of postgraduate courses at medical schools, only a relatively small percentage of doctors attend.

INFORMAL MISCELLANEOUS SOURCES

In addition to the formal and informal means of acquiring medical knowledge discussed thus far, physicians also have available large numbers of medical information or abstracting services.

The National Science Foundation and the National Academy of Medicine are typical. More specifically, the National Institute of Health has a cardiovascular research project center, which publishes an index handbook of cardiovascular agents. Through its cancer chemotherapy information center and psychopharmacology service information center, NIH also provides abstracts within six weeks of the original article listing author and subject.

The physician may also subscribe to the Medical Letter of Drugs and Therapeutics. Published bimonthly by a nonprofit corporation, the Letter purports to provide physicians with objective appraisals of new drugs.

The physician can also subscribe to *Current Contents*, a weekly scanning service which photocopies the contents pages of some 65 medical or allied journals, within about ten days of the journal's appearance.

In addition, there is *Clin-Alert*, a card service provided by the National Clearing House for Poison Control Centers which furnishes information on the toxic effects of various therapeutic agents.

Literature supplied by the various drug companies likewise must be considered as informational or educational, since the content is based on FDA approval.

Moreover, correspondence between physician and pharmaceutical companies on drugs, their applications, or even generalized questions can also be considered as an informal educational source.

RECORDINGS BY SUBSCRIPTION

Medical recordings have been sold by subscription to the profession. One such, "Voice of Medicine," is prepared under the direction and supervision of the Excerpta Medica Foundation, the records containing discussions and interviews from national and international medical meetings, clinical and pathological conferences, world health assemblies, symposia, special panels, and discussions by leading specialists on subjects of current medical interest.

A similar type of recording is Audio

Digest Tapes, sponsored by the Audio Digest Foundation of California.

Another company, Smith and Holst, Inc. of California, has developed and sold a series of illustrated medical lectures (film strips and tape recordings accompany them) produced by Loma Linda University School of Medicine. The American College of Surgeons have made available their panel discussions, "Clinitapes," which can be purchased cheaply and played on any cassette tape machine.

Pharmaceutical companies, as was noted earlier, have also recorded significant items of medical interest and distributed them to physicians.

A few years ago a transatlantic telephone discussion between American endocrinologists and European colleagues in Amsterdam on the effects of estrogens in the menopause was recorded under the auspices of Ayerst Laboratories, and made available free to physicians on 12-inch LP records.

OTHER AUDIO OR VISUAL SERVICES

Albany Medical College, through station WAMC, New York, broadcasts a two-way radio conference among several associated hospitals. The technique consists of a panel discussion or a lecture followed by a forty-minute question period. Physicians in the radio-connected hospitals telephone their questions through a moderator. The panelists then answer the question on the air. Programs have been held weekly for twenty-four weeks during the year.

The U.S. Department of Health, Education and Welfare, through the Federal Advisory Council on Medical Training Aids, offers a film reference guide for medicine and allied services. Revised annually, the guide, in addition to technical information (sound, silent, color or black and white, viewing time, number of scenes), describes the film content and presents information on distributors and methods of procurement.

Medical slide libraries sponsored by pharmaceutical companies (Schering, Ciba, et al.) provide slides at cost to the physicians.

COMMERCIALLY SPONSORED EDUCATIONAL PROGRAMS

As I noted earlier, seminars, conferences, and symposia have been sponsored by pharmaceutical companies like Schering, Lederle, Merck, Sharp & Dohme, and others. Most seminars or round table discussions are devoted to a single field of therapy and may or may not be related to the sponsoring company's products. These seminars are regional in character in that local medical societies hold them. There is an average of eight to 12 seminars a year with an average attendance of 250 to 300 physicians.

A locally prominent physician generally chairs the meeting and introduces the guest specialist. In some instances, such as Schering's doctor-to-doctor programs, the round table discussions are transcribed and mailed free to physicians.

Not all seminars or meetings have the sponsorship of the pharmaceutical industry. Smaller meetings are held at local society headquarters or a community hospital facility. Simple or complex case studies may be presented, or visiting authorities may present problems or medical case histories.

Programmed instruction is also offered for continuing medical education. Thus far, two pharmaceutical companies, Schering and Pfizer, have underwritten such programs for the profession. The average course requires three to five hours of physician study.

The use of teaching machines in a

continuing education program has been conducted by the Massachusetts chapter of the American Academy of General Practice at the Newton-Wellesley hospital in Boston (1972). Approximately 200 physicians were invited to participate. The course was a programmed instruction film strip on "Diabetes Control, A Review Course."

Television has been used intramurally and extramurally for post-graduate medical education on closed and open circuit since February, 1947 (when Johns Hopkins telecast a surgical operation on closed-circuit).

Dermatology, being a truly visually-oriented specialty of medicine, has explored bidirectional interactive television as a means of extending the eyes of the dermatologist to provide consultation services to patients many miles away. A report in 1972 in *Archives of Dermatology* noted that experiments have been carried out over the past five years, first at the Logan International Airport and later at the Veteran's Hospital in Bedford, Massachusetts, to determine the feasibility of television in diagnosing and managing dermatologic disorders. The experiments appear to be successful. A dermatology clinic has been run once a week at the Veteran's Hospital with two dermatologists located at the Massachusetts General Hospital.

On May 28, 1959, an attempt to use television for the commercial promotion of ethical drugs to the medical profession was made by Ciba. It was to be a fifteen-minute open-circuit television show entitled "This Week in Medicine," and was shown in Binghamton, Dallas and Kansas City. Although there were no objections from the viewing profession or the laity, the propriety of commercial advertising and the type of program (public display of certain medical or surgical aspects) was questioned by the AMA and the programs were halted.

The Upjohn Company has shown interest in a medical newsreel ("Monthly Medical News") for showing at hospitals, county or state society meetings, or for televising in key areas. Upjohn has also sponsored a conference-type series known as "Grand Rounds," which is shown on closed-circuit television in various cities.

A. H. Robins Company subsidized a ninety-minute closed-circuit telecast on medical and surgical subjects in April, 1963. The telecast, originating in New York, New Orleans, Minneapolis and London, was seen in 60 cities.

Merck, Sharp & Dohme, Roche and others have for some time now used open-circuit television as a "convention" TV telecast of highlights within the vicinity of national medical meetings. For example, this year the 1973 AAFP meeting in Denver was televised to and through local hotels on a special channel.

RECENT DEVELOPMENTS

More recent developments include new therapeutic film showings at national meetings (Schering-Skin Diseases, Hypertension) videocassettes (surgery, psychiatry, etc.) that can be viewed through home TV (Primary Med. Communications, N.Y.C.) Univ. of Pitt. Med. AV programs, cable TV, teleconsultation, and tapes.

Most recently mediphone has been introduced. Originally initiated in Chicago in 1972, it has just become a nationwide physicians information service (physician to consultant specialists).

Yet, despite all these developments, according to reports from the 1972 annual conference on medical research in education sponsored by the Association of American Medical Colleges, many of the available opportunities for continuing medical education are barely being used by the average physician.

The need for CME is great, and as Mr. Mac Cahal, publisher of the new medical

journal *Continuing Education* stated in his first issue, August, 1973, "Educational concepts and the ambience of medicine change from time to time. The present status of medical practice and medical education present a crying need for continuing education. Twenty years from now the situation will likely be different and the need may no longer exist. But right now the need is real and urgent."

A. C. Barnes, M.D., vs. J. F. Schamberg, M.D.: A Chemotherapeutic Confrontation[1]

By IRA LEO SCHAMBERG, M.D.[2]

Albert Coombs Barnes and Jay Frank Schamberg were born in Philadelphia, were graduated together from Central High School in 1888 and from the School of Medicine of the University of Pennsylvania in 1892. In medical school one day after class Barnes came to Father and asked him to act as second in a duel. Father refused. The next day Barnes burst into his room and said, "My God, Jay, I've killed a man!" Outside a student lay unconscious on the sidewalk. It turned out that the duel had been with fists, that Barnes had knocked his opponent down, his head hit the curb, and he was out cold. A few minutes later he came to with nothing worse than a bump on his head.

In later years, Barnes substituted his tongue and his pen as weapons of attack. An example of his talent for vituperation is provided in a biography (1). In November, 1937, he read in the newspapers of the Philadelphia (then Pennsylvania) Museum of Art's purchase of Cezanne's "The Bathers." The article hailed the museum's acquisition as "the greatest masterpiece by one of the greatest painters of all times." The Museum stated that "a smaller picture, a second version, is in the collection of the Barnes Foundation in Merion." Barnes immediately attacked. Responding to a letter in the *Evening Bulletin* signed "Syndic," which compared the merits of the two paintings, Barnes wrote "A final word of caution to the Museum officials and their friends is that I shall not tolerate the repetition of any such cowardly, unsigned vilifications as those of the supposedly unknown 'Syndic' . . . I shall match all such dirt by the public spilling of more potent dirt, and validate it by corroborative testimony: for example, Tyson's (Carroll S. Tyson, a member of the board of governors of the Museum for 20 years) admission that he was half drunk when he talked to the reporter about the Museum's copy of "The Bather;" that the reason so many respectable women consider your pot-bellied friend . . . the most disgusting man in the city is that—these women claim—his lecherous look and manners make personable women feel as if they were being stripped naked in public."

Father and Barnes remained friends after medical school days. Barnes presented my parents with a silver cigarette case as a wedding gift in 1905, and he and his father were patients of my father in 1917.

After graduation, Barnes went to Germany where, with a German chemist, Hermann Hille, he produced mild silver proteinate. Under the name of Argyrol, this made him many millions of dollars. As late as 1941, it still was cited as the best medication for intraurethral irrigation for male gonorrhea (2). Argyrol is still available. It is stated to be indicated in prophylaxis of opthalmia neonatorum, in conjunctivitis, and for installation in the nose for various complaints.

Early on, Barnes earned the right to be

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considered a connoisseur of art. After burning up all 190 of his own paintings because he found them inferior—a judgement of himself he could never tolerate—he started to collect the paintings of others. In 1912 he commissioned his old friend, William Glackens, a classmate at Central High School and an artist of the 'Ashcan' school, to go to Paris and buy $20,000 worth of paintings. Glackens returned with twenty choice works, which formed the nucleus of his extraordinary art collection still housed in Merion. Barnes was killed in an automobile accident in 1951.

Following postgraduate study in dermatology in Vienna, Paris and Berlin, Father returned to Philadelphia in 1893 to the practice of dermatology. In 1912, Peter A. B. Widener came to him suffering from psoriasis. When Widener learned from Father about the lack of knowledge concerning this common chronic skin disease, he provided funds with which Father, John A. Kolmer, an immunologist, and George Raiziss, a biochemist, founded the Dermatological Research Laboratories. Much work was done on psoriasis. In addition to these studies, when Father saw the imminence of American involvement in World War I, he set Dr. Raiziss to work to synthesize salvarsan and neosalvarsan, Ehrlich's "Magic Bullets." Germany was then the sole source of supply of these drugs. For nine months the D.R.L. was the only source of the drugs in this country, and from 1915 to 1920 it served as the major manufacturer. Other chemotherapeutic endeavors were carried out by the laboratories, as will become evident from the letters which follow. The D.R.L. was sold to Abbott Laboratories in 1920 and continued their work under the name of The Research Institute of Cutaneous Diseases.

All proceeds from the sale of arsphenamine and neoarsphenamine, amounting to $750,000 were devoted exclusively for medical research. I recall that in 1932, when the stock market crash had wiped out most of Father's estate, the federal government refunded to the Research Institute some thousands of dollars of tax which had been overpayed. It would have been a simple matter for the three doctors to have divided this amount for their personal use, but their integrity commanded them instead to turn it over to the Research Institute.

Following Father's death and Raiziss' in the late '40s, the Research Institute was transferred to Temple University where it continued to function under the direction of Dr. John Kolmer until his death.

Father also carried on a busy dermatologic practice. He authored four books and published over one hundred papers. Two diseases bear his name: A Peculiar Progressive Pigmentary Disease of the Skin, which he described in 1901, and infestation with pediculoides ventricosus, the straw mattress mite, which he described with Joseph Goldberger of the U.S. Public Health Service in 1904. During his professional career he served as professor and chairman of the Department of Dermatology at Temple University School of Medicine, Jefferson Medical College, and the Graduate School of Medicine of the University of Pennsylvania. In 1931 he was elected president of the Philadelphia County Medical Society. He was appointed chairman of the Section on Dermatology and Syphilology of the American Medical Association in 1929. He died in 1934.

And now to the letters which spell out the chemotherapeutic confrontation:

Overbrook, Penna.
May 7, 1917.

Dear Jay:

Ever since last Friday when you told me about mercurophen, I've had a conflict between my desire to mind my own business and my

wish to prevent you from harming yourself and the Polyclinic with your product. But I have decided to tell you why your product is not what you claim, viz: "best antiseptic in the world", "worth a hundred thousand dollars", "safe for physicians to use intravenously".

First, it violates established scientific laws governing the relationship between chemical constitution and physiological activity, which laws are easily accessible in literature bearing upon the subject. Dozens of products of mercury with the phenol, resorcin, tribromophenol, kresol, benzoic acid, etc. groups, have been the means of establishing these laws. In fact, I think you will find that your product was made in Germany about eighteen years ago under the name Phenegol and soon went to the junk-pile for violation of these laws.

In the summer of 1906 I went to Europe to talk with Schmiedeberg, Dreser, Ehrlich and Gottlieb about two mercury products which I thought would be world-beaters. I was armed with the products, beautiful bacteriological reports, protocols of animal experiments (done by Hoyt at the University of Pennsylvania) showing non-toxicity, and a fine lot of assurance and enthusiasm. I came back with a wholesome respect for sound special knowledge and experience, a contempt for bacteriology except as a comparatively negligible relativity, which acquisitions I felt compensated me for putting the two mercurials in the morgue of my dead hopes. My reason for reciting this is that one of the products was mercurophen, which died unchristened from scientific suffocation.

So, when you shoot your rocket and bathe in the light, look out for the stick. Of course, I shall be silent except to say, privately to you, that, for the sake of your splendid powers, you ought to get rid of the unconscious phantasies which will make for the continuation of such sophomoric blunders as mercurophen. A psychoanalysis by Laurence Buermeyer, Graduate College, Princeton, will substitute coordinated efficiency for the present state of menace to yourself, science and those who believe in you.

With kind regards, I am

Very truly yours,
(signed) A. C. Barnes.

* * *

Overbrook Pa.
May 11, 1917.

Dear Jay:

My father was due to see you this morning but your thorough treatment made his return unnecessary. So I am enclosing check for ten (10) dollars in payment for your services to him and me.

Your silence on my letter of May 7th indicates ungraciousness and poor sportsmanship. You ought to thank me for telling only you that mercurophen is an ancient derelict. Another person would probably have awaited your publication and then recited in quotation marks the obituary of your product as it was published years ago in the authoritative form I find it in my library. He would have exhibited also advertising circulars of a dozen extinct mercurials in which your claims and laboratory data on mercurophen can be found in their entirety.

Opinions on your "99" and "105" were asked of me sometime ago and I said nothing. I would have continued silence if you, a tyro in the game, had not had the bad judgment to laud them to me, a specialist of twenty years experience, in terms which seemed the marks of either a fakir or an ignoramus.

One of my side-interests of late years has been in studying abnormal psychology which in your case takes the form of an identification-neurosis. It manifests itself pathognomonically in the exhibition-bottle of mercurophen on your desk, your constant chatter about chimiotherapy, your writings, your manner, and even the adornments of your person.* The difference between you and the asylum Napoleons is not one of kind but only of degree. It is responsible for the inveterate four-flushing which has amused me since our boyhood days, and for the way in which you take the obvious, touch it up with your complexes and turn out potboilers which you believe are masterpieces. It robs you also of the natural grace which your age and position should have conferred.

Hence my suggestion that you be psychoanalyzed in order to banish your phantasies and become a normal human being endowed with good native talents. If you do, I am sure you will express the gratitude due for my recently-tendered kindness. At any rate, remember I didn't butt in on your foibles—you forced them on me in a manner offensive to good taste.

Yours truly,
A.C. Barnes

* Barnes here refers to Father's meticulous attire. A black ribbon (bendel) hung from his glasses, and he wore spats and white piping on his vest.

May 26th, 1917.

Dr. Jay F. Schamberg,
Sec. Comm. of Arrangements,
Class of '92, Med. U. of P.
Philadelphia, Pa.

Dear Mr. Secretary:

I have received your invitation to attend the twenty-fifth anniversary of our graduation. Permit me to suggest a fourth sporting-event, with substantial stakes, for the celebration on June 8th, viz:—

The definition of the status of mercurophen and its sponsor as revealed in the Journal A. M. A. for May 19th, 1917.

I would take the affirmative side that the discovery of the product was published many years ago, exploited commercially and later abandoned. Its American sponsor I would class as a quasi-scientist who exhibits the signs and symptoms of a Freudian neurosis in need of treatment.

I am ready to deposit with our classmate Dr. David Riesman, a certified check for ten thousand (10,000) Dollars providing our secretary, as my opponent, will deposit there his certified check for the same amount. The winner is to have his check returned and the loser's check is to be given to the Red Cross Section of the Overbrook Branch Needlework Guild of America for war relief.

As a tribunal, I propose a scientist of my selection, one chosen by our secretary, a third agreed upon by these two, of which board a majority decision shall be final.

A request from the proposed stake-holder will get immediately my certified check, the name of my referee and my acceptance to participate in the reunion.

I waive the right to demand that this letter be placed in the official files of the secretary of the class committee, but am willing to have it treated as personal or official at the option of the secretary.

Yours truly,
A. C. Barnes.

Delivered personally to
1922 Spruce Street.

* * *

Feb. 14th, 1919

Dear Jay:—The explosive "hello Jay" on the street to-day was a spontaneous burst from early pleasant memories. I'd forgotten about the letters I'd written you about mercury—but your cool nod brought them back. In fact I'd never thought of the subject until a Harvard professor asked me last Spring the difference between your products & the originals. I'd said nothing to him about them, nor my letters. I've never been a rival of yours & now that my work lies in other & congenial fields, I'm writing this in the mellower spirit that age has brought to bear on all past experiences tinged with emotion. So I think if the recognition & greeting today had not been simultaneous and over-quick I'd taken a chance on penetrating your armor. Life is a much bigger game than warrants pettiness.

Sincerely,
Barnes

Manufacturers Club
of Philadelphia

* * *

February 25, 1919.

Dr. A. C. Barnes,
Overbrook, Pa.

Dear Barnes:

Your letter of February 14, 1919, has remained unanswered up to the present time owing to the fact that I have been searching for several letters written to me by you in the Spring of 1917. I have unearthed these in one of my drawers, and am enclosing copies thereof to you. In your recent note, you say that you had forgotten the letters that you had written to me, but my cool nod recalled the memory of them. I declined at the time to make reply to the letters in question because their extravagant verbiage and audacious insolence gave me serious doubt as to the sanity of the writer at that time. The only condonation for the writing thereof would have been a temporary aberration.

During the period of the war, owing to the fact that we were called upon to supply "606" to the various Government services, we were unable to do any further work upon the mercurial compounds in which we were particularly interested. One of these, No. 99, named by us Mercurophen, was the particular object of your scorn. Through a more rigorous search of literature, we established the fact that one of your statements in connection therewith was correct, namely that the compound had been prepared before. A very considerable trial of this compound has been made by clinicians throughout the United States, many of whom are most enthusiastic about its effects in the

treatment of certain pathological conditions. We have recently completed an exhaustive laboratory study of this compound which will shortly be published in the Journal of Infectious Diseases.

It is perhaps strange that my associates and myself should cling to the opinion that this compound is a valuable one in the face of the statement "of a specialist of twenty years experience", that it should be cast into the "junk pile".

Very truly yours,
Jay F. Schamberg

* * *

February 26, 1919.

Dear Jay:

I'm glad to get your letter of February 25th—first, because I have'nt a thing against you personally and second, because it is a fine bit of corroborative evidence of the statements in my letters which made you doubt my sanity. But, really, you have only yourself to blame for those letters: You strutted in front of me with wild assertions about a product which I had known as an abandoned one for twelve years, and then after I had told you the truth about the product and some things about yourself which everybody with discernment knows, you violate scientific respectability with frothy blather in the Journal A. M. A. about a "new a superior mercurial", or some such characteristic bunk. You ought to be damned thankful that I didn't publish the obituary of mercurophen in the next issue of the same Journal.

However, you know now that at least one statement I made is true—and I'll venture a bet, which is this:—I can make just as good on every other statement in those previous letters as you confess I did about your wonderful discovery. I'll do it with your books, your talk, your letters, your habits, your daily actions—every one of which line up with straight Adlerian psychology: you have an absolutely typical compensation (identification) neurosis which is responsible for the various phantasies, delusions, etc., which I noted in my previous letters. That you are unconscious of it does not alter the fact and if you had an open mind I'd suggest that you get Lyman Wells' "Mental Adjustments" and read your biography in the second and third chapters; and after that Adler's "The Neurotic Constitution" and you'll see that I'm just as right about my diagnosis of your personal over-compensations as I was about the scientific cripple you paraded in public on the crutches of your neurosis.

Now one other thought and I'm through: You are I believe a successful practitioner of a special branch of medicine; but as a scientist you're a piker—and for obvious, straight psychological reasons, viz: With your superb energy, great ambition, and a path through life nicely-paved by others, you've had very little stimulus to get the necessary training in science that would enable you to refuse to cash in, in the form of tufts, struts, brass, and the like, the contributions of real scientists. You have the evident psychology of the politician, business man or broker in any of which field you would have succeeded; and when you attain distinction and renown from such things as mercurophen, 606, etc., you are doing it as a business man or politician. That you consider your work scientific is merely a confusion of values or in other words, plain delusions. Your forthcoming publication on the value of mercurophen is obviously an effort to save your face; also a neurotic symptom.

Now consult the literature on normal and abnormal psychology—vicariously, of course—and you'll find that the other labels I pasted on you in those other letters were just as genuine as the one about the origin of mercurophen. But as I said before, I have nothing against you personally—in fact when you used to stop four-flushing and patronizing long enough to be human, I had—and still have—a friendly affection for you.

Yours sincerely,
A. C. Barnes.

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ALBERT C. BARNES
MERION, PA.

February 27, 1919.

Dear Jay:

In the enclosures in your letter of February 25th you failed to include the not least interesting of the 1917 series of letters. It is rather important in the light of the developments since then.

I'm really sorry I had to slam you again in my letter of yesterday; but friendly overtures in a rumpus that was forced on me while a patient in your office deserve better treatment than your condescending, sublimatedly-egotistic letter of February 25th.

Just one other remark is due now that I am on the subject of your hoped-for re-education: Mercurophen has not the qualities of a comeback, be your laboratory-clinical propaganda ever so strong. I know two men in America

besides myself who could write a five hundred word report on mercurophen that would discredit it, your report and your work in that line for time everlasting. As I said before, to exploit mercurophen now is to hark back to a period before the laws between chemical constitution and clinical properties were so definitely established as they are now; that is not progress, it's traditional, irrational fixation.

But, let me drop telling you unpleasant things, and instead ask you, as a connoisseur in cigarettes, to try the brand I'm sending with this letter.

Yours sincerely,
A. C. Barnes

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ALBERT C. BARNES
MERION, PA.

March 1, 1919.

Dear Jay:

The cigarettes, my messenger of good will, came back this morning. So be it—my hat is in the ring,—if that is your attitude!

Should, however, you develop sincere contrition, I offer the resources of my pen in preparing for the Journal of the A. M. A. the apology you owe them and the medical profession for publishing as a "new and superior mercurial germicide" a product which "a specialist of twenty years experience" had told you beforehand was an abandoned derelict. I'll do it without mentioning the psychological vagaries that explain the conflict that necessarily arises when commercialism, even when camouflaged, comes in contact with an inordinate ambition stimulated by phantasies of scientific achievement.

Yours sincerely,
A. C. Barnes

P. S. I suggest that you turn the correspondence over to Dan McCarthy whom I know has done reading in Freud, Adler, Jung, etc.

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John Davidson Godman (1794–1830): Physician and Naturalist[1]

By STEPHANIE MORRIS, B.S.[2]

John Davidson Godman was an anatomist, naturalist and author. His reputation as an anatomist rests mainly on his teaching activities in the Philadelphia Anatomical Rooms. His abilities as a naturalist are seen in his three volume work, *American Natural History*. His writings reflect all of his interests.

John D. Godman (Figure 1) was born on December 20, 1794, one of the eight children of Samuel and Anna (Henderson) Godman of Anne Arundel County, Maryland (1). Orphaned in 1805, he then lived with an aunt in Wilmington, Delaware. While still very young he could read, having learned the alphabet "on his grandmother's knee (2)." Following the death of his aunt he moved to Baltimore where a married sister, Mrs. Stella Miller, lived and where in 1811, at the age of 17, John was apprenticed to a newspaper printer. In Baltimore, Godman met Dr. William Luckey, a senior student in the office of Dr. Thomas E. Bond. Dr. Luckey would be an important figure in the future physician's medical education. The boy had become interested in medicine and had often visited Dr. Bond's office to read the medical labels, having become adept in Latin (3). His work in the printer's office was monotonous; he described it to Dr. Luckey as "cramping (my genius) over a font of types where there are words without ideas (4)." In 1813 Godman wrote to his friend about the malady which has

> "commenced its direful effects on my poor body. A continued pain in my breast, and at night a slow but burning fever, convince me that I am travelling down a much frequented road to the place where disease has no effect."

The physician believed the young man was laboring under a hypertrophy of the heart (5). Despite this condition John enlisted as a sailor and served with Commodore Joshua Barney's flotilla in the Chesapeake Bay (1814-15). Godman at this time was reading chemistry as a way of beginning his medical education.

Following his discharge in 1815, Godman reluctantly returned to printing. Dr. Luckey, now practicing in Elizabethtown, Pennsylvania, offered him a job in his office. Here Godman continued his self-education by reading. His preceptor Luckey described the twenty-one year old scholar's accomplishments (6):

> "in six weeks he had acquired more knowledge in the different departments of medical science than most students do in a year. During this short period, he not only read Chaptal, Fourcroy, Cheselden, Murray, Brown, Cullen, Rush, Sydenham, Sharp, and Cooper, but wrote annotations on each."

Returning to Baltimore in 1816, Godman attended lectures at the University of Maryland School of Medicine and studied under Dr. John Beale Davidge (1768-1829), professor of anatomy, whose demonstrator he soon became. The student quickly established a good

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Fig. 1. John D. Godman, M.D. Etching by Albert Rosenthal, from an original painting in the possession of D. Hayes Agnew, M.D. Photo in the Bradley Collection, The College of Physicians of Philadelphia.

reputation among the faculty and was called upon to substitute for Dr. Davidge when the latter was injured in the autumn of 1817. According to Cordell's history of that institution, this was the only instance on record in the annals of the University of which a student has lectured to fellow-students (7). Cordell goes on to cite a tradition that Godman held the interest and attention of the class so closely that a pin could have been heard to drop (8). The minutes of March 26, 1818, meeting of the Regents of the University include Godman's

name among those to receive a "Doctor of Physick" degree on the first Monday of April, 1818 (9).

Following graduation, Godman practiced medicine in New Holland, Maryland, for a few months but then returned to Anne Arundel County, Maryland. Here Godman made the observations which were to become the basis of *Rambles of a Naturalist.* In this collection of essays, Godman discusses the molting of crabs, the majestic beauty of the full-grown pine forest and his unsuccessful attempts to capture the impudent and troublesome crow. The physician-naturalist described (10) that part of Anne Arundel County where he practiced as "being washed by the river Patapsco on the north, the great Chesapeake bay on the east, and the Severn river on the south." Godman's patients were not all located in the small town of Anne Arundel; many were in the surrounding country. Godman (11) describes the life of the resident physician as not being easy but rather filled with

"incessant toil and severe privation. Riding from morning till night, to get round to visit a few patients, his road leads generally through pine forests, whose aged and lofty trees, encircled by a dense undergrowth, impart an air of sombre and unbroken solitude."

When the chair of anatomy at the University of Maryland was left vacant in 1819 by Professor William Gibson's departure, Godman hoped to be appointed to it. Although his ability to lecture had already been demonstrated and was "freely acknowledged, his youth was considered to be an insuperable obstacle (12)." Failing to be appointed, the twenty-five-year-old physician moved to Philadelphia, the center of medical and scientific leadership and the home of leaders such as Rush and Wistar.

Here Godman began teaching in the Philadelphia Anatomical Rooms. This private institution had been established by Dr. Jason Valentine O'Brien Lawrence (1791-1823) and was located in the vicinity of the University of Pennsylvania (13). The private lectures offered here augmented the course of study at the University's medical school and provided a refresher course for students preparing for their graduate examination as well as for any physician who wished to attend. The analytical method of teaching was used. The class stood close to the dissecting table and observed the lecturer as he explained the structure and functions of the parts of the human body, referring to the entire cadaver on the table. The students were encouraged to question the lecturer, allowing nothing to be said that was not proved by demonstration. Dissections were also performed by the students. This was a new method of teaching. In the usual technique, the synthetic method, the lecturer displayed isolated segments of the body to the class. In 1821, while Godman was in Philadelphia, Dr. Daniel Drake (1785-1852), president of the newly incorporated Medical College of Ohio, visited the University of Pennsylvania. Drake was looking for someone to fill the chair of surgery and demonstrative obstetrics at the Cincinnati school. Dr. William Gibson referred him to Godman. Dr. Gibson had held the chair of anatomy at the University of Maryland before leaving in 1819 to take a position at the University of Pennsylvania. Drake spoke with Godman, who accepted the position.

Before leaving Philadelphia, Godman married Angelica Kauffman Peale, the daughter of Rembrandt Peale, on October 6, 1821. After the wedding, the Godmans travelled to Cincinnati, arriving in time for the November session of the College. Of the journey, Godman (14) wrote to Franklin Peale, his wife's uncle:

"Our voyage down the Ohio was pleasant enough, but insufferably tedious as we were 17

days on the Ohio River—10 of which were spent in an open boat; from the time we left Wheeling till our arrival here. With the exception of having our boat sunk *once*, and all our clothes and my surgical instruments wet—together with a few et cetera's—the voyage was by no means disagreeable."

The faculty of the Medical College of Ohio (chartered in 1818) consisted of five physicians and a minister. The shuffling of occupants of chairs and of duties led to bitter personal hostilities which eventually resulted in Drake's resignation in 1822. Godman, disgusted by the intrigues of the other faculty members and disappointed by the small class size (seven were to receive degrees in the spring), resigned his appointment effective at the close of the first session. He remained in Cincinnati, though, as he had taken on other activities there. Godman labelled the ancient coins and medals of the Western Museum and also taught himself German and Spanish. This self-education program would eventually include Latin, Greek, French, Spanish, German, Italian and Danish. He had also opened a private practice in the spring of 1822. Godman believed (15) that the physician who has studied the science of General Anatomy has learned the "established laws of the healthy texture." This knowledge of the anatomy of textures, whether these be found in the substance of tendon, muscle, ligament or bone, is

"the death-blow given to the notions so flattering to our ignorance, of specific and incurable diseases; and not less important, the termination of the science of bestowing upon *symptoms*, names expressive of some real *entity*, which is called the Disease."

The physician can trace the disease to the part which originally suffered and act to restore it to the equilibrium which is essential to the performance of the vital functions. Medicines and bleeding are used to restore to normal the great functions of digestion, circulation and nutrition. Drake, who had brought Godman to Cincinnati, introduced him to medical journalism (16). Godman and John P. Foote, a Cincinnati bookseller, issued the first number of the *Western Quarterly Reporter of Medical, Surgical and Natural Sciences* in March, 1822. Godman alone wrote about half of the 600 pages published in the journal's two-year history. *Western Quarterly Reporter* received support from Kentucky, Indiana, Illinois, Missouri, Louisiana, Ohio, Virginia and western Pennsylvania (17). In the first article, Godman describes the necessity of a good medical education. He notes (18) a recent change in the professional requirements:

"Nothing seems requisite but the possession of the titular distinction, and a smattering of the routine which has been for a long time pursued, by those who have gone before."

"Physician" was once synonymous with "Learned Man." But now a youth need only answer a few questions and assent to certain opinions and he becomes a doctor. Education is not the acquisition of any particular set of facts; it is learning to judge correctly and to discriminate between false and true. The best way to acquire this ability is through a study of classical literature. Attending to the true meanings of words leads to the development of accurate modes of thought and expression. This ability to think will enable the future physician to deduce general principles which will guide his judgement, such as that of the healthy texture and the interrelationships of structure and function.

Godman also wrote on the reputation of the medical profession (19). The physician can gain a popularity which

"may not be as profitable as that of the statesman, but which is infinitely more agreeable, because it is the spontaneous offering of

grateful minds, elicited by benefits personally conferred."

As discoveries accumulated and modes of thinking improved, the estimate formed of the true value of medicine varied. Standards for reverence and esteem had to be established. One criterion could be the actions performed by the physician for the benefit of society and for the honor of his profession. Godman cites examples, discussing the "justly celebrated Boerhaave" who "avoided the introduction of obscurity and mysticism." Another is Cullen, the excellence of whose mind was in the correct appreciation of the useful, the simple and the methodical throughout his professional labors. Godman (20) also asks, "Where indeed could an example of Medical excellence be found to be compared with Rush, who has been properly styled 'immortal' " and who excelled in every effort?" Godman encourages young physicians to study the characters of those who are known as the best and improve their own habits and manners by following these examples. This would place the profession on its proper foundation and gain for it its proper respect.

Six issues of *Western Quarterly Reporter* appeared in 1822-23. Godman left Cincinnati in the autumn of 1822; Drake's biographer suggests that Drake edited the last three issues (I:4, II:1,2) and that after Drake left Cincinnati in late 1823, the *Western Quarterly Reporter* was not continued (21).

Godman returned to Philadelphia in the autumn of 1822. He resumed teaching in the Philadelphia Anatomical Rooms, becoming the (second) director after the death of the founder, Dr. Lawerence, in 1823. This private institution expanded to include a reading room and library; in the 1823-24 session Godman had seventy students. Three series of lectures were given, running successively September through April. The autumn course was held from the first week of September to the first of November. These lectures, offered twice a week, covered osteology, anatomy of the brain, fractures and other topics. These were designed to prepare the class for the winter session (second week of November to the first of March). This series discussed the soft parts of the body in four lectures a week. During the spring course, there were two lectures a day. This session (March 1 to April 1) was to accommodate those being examined for a degree and consisted of a series of "minute reviews of the most difficult parts of Anatomy (22)." Godman favored the analytical method of teaching. This mode of teaching anatomy by analysis which, Godman claimed, "it has been my happiness first to introduce and establish," frees the profession from the dominion of ancient errors that have become "prescriptively established" by frequent repetition (23). No authority is accredited but demonstration. The dissections and observations made here are described in Godman's *Anatomical Investigations*, published in 1824. Irregularities in structure and pathological conditions are discussed as well as the healthy structure. Illustrations accompany some of the discussions. One of the discoveries which resulted from these dissections concerned the fascia of the human body. This sheet or band of tissue invests and connects the muscles. In the early nineteenth century, the fascia had been considered very numerous and in a great degree independent of each other. Godman reduced the variety to three, "*all* of which are fairly continuous at certain points (24)." Although Godman does not claim great merit for *proving* the continuity of the fascia, he does expect the thanks of anatomists, physiologists and every unprejudiced student for making the fascia's natural condition

more intelligible and "for having in this part of the science substituted simplicity for complexity and regularity for confusion (25)." One segment of the fascia, at the root of the neck extending to the pericardium, is today called "Godman's fascia." The dissecting table used in the Anatomical Rooms is described in *Anatomical Investigations.* This table had movable segments which allowed the cadaver to be studied in a variety of natural positions. The illustrations for this short pioneering work were drawn by Lesseur and Rembrandt Peale, noted Philadelphia artists and the latter, Godman's father-in-law.

Godman's *Contributions to Physiological and Pathological Anatomy* (1825) was also based on observations made in the Anatomical Rooms. In this short work he lists three obstacles to the study of anatomy. These are the actual difficulties of acquiring a thorough knowledge of anatomy, the prejudices against it, and the absurd idea that a man can become a good practitioner without it. The practitioner who lacked knowledge of this science advanced with "faltering and undecided steps; *guessing* at the conditions of the various organs (26)." Godman blames the lack of advancement in the science of medicine on the disregard of anatomy and anatomic-pathologic studies. One of Godman's contemporaries, Samuel Jackson, believed him to be the pioneer pathologist of Philadelphia (27). Godman's eighty-four page *Contributions* is the earliest-known native publication on morbid anatomy (28).

In 1824 Godman edited volume four (new series) of the *Journal of Foreign Medical Science and Literature.* In 1825 Godman was a member of the editorial board of the *Philadelphia Journal of the Medical and Physical Sciences.* He wrote several articles for this journal, which was renamed the *American Journal of the Medical Sciences* in 1827. He also contributed critical reviews to the *American Quarterly.* Being fluent in seven languages, he translated many European works. These included Coster's *Manual of Surgical Operations* (1825) and Lessuer's *Lafayette's Travels in America* (1826). Godman also edited Cooper's *Treatises on Dislocations and on Fractures of the Joints* (1825) and John Bell and Charles Bell's *Anatomy and Physiology of the Human Body* (1827).

Godman was active in non-medical areas during his second stay in Philadelphia. A member of the Academy of Natural Sciences of Philadelphia, he was on several subcommittees that reviewed papers dealing with natural history topics (1824-25). These previews were to prevent errors from being published in the Academy's *Journal* and occasionally to suggest revisions. For example, one subcommittee which included Godman suggested that "the English name be either more philosophical or altogether omitted (29). If the report was favorable, the paper was accepted for publication in the *Journal.* Godman published two papers in the *Journal;* one, "Description of the Os Hyoides of the Mastodon," appeared in volume IV (1824-25) and the other, on the genus Condylura, appeared in volume V (1825-26).

Godman was elected to membership in the American Philosophical Society in 1825. He published a paper on a new genus and species of an extinct mannifer-ous quadruped in volume III of the Society's *Transactions* (new series, 1830).

In 1824 Godman was elected to membership in the Franklin Institute. He offered to lecture on natural history and delivered two lectures to the Institute members in 1824 (30). When the Board of Managers established a chair of natural history on September 8, 1825,

Godman was appointed to it (31). He lectured on Tuesday nights, alternating weeks with the professor of natural philosophy, as part of the Committee on Instruction's program of nightly lectures. Godman encouraged all to study natural history, as it increases the powers of observation and offers an inexhaustible supply of rewards. The intellect is refreshed by this study (32).

Godman was now preparing a three volume work, *American Natural History*. This extensive study included the generic and peculiar characters of each species. The names are given in English, French, German and Italian. The description includes notes on the economic history of the animal. In the article on Bison (v.3), for example, the Indian method of capturing and cooking these animals is related, while in that on Whales (v.3), whaling is discussed. The first edition was published in 1828 by H. C. Carey and I. Lea. Subsequent editions appeared in 1831 and 1836.

In 1826 Godman was offered the chair of anatomy at Rutgers Medical College, New York, recently organized by five physicians who had resigned from the faculty of the College of Physicians and Surgeons, New York, following bitter quarrels there (33). Godman resigned the chair of natural history at the Franklin Institute, citing what he termed his duty to devote his "especial attention to the Practice of Medicine and Surgery and the Teaching of Anatomy (34)." In his introductory lecture at Rutgers, Godman (35) outlined a "general sketch of the rise, progress, decline, and decay of the human body, preparatory to some considerations relative to the practical study of our subject." Following a brief but picturesque discussion of the physical changes that occur during an individual's lifetime, Godman turned to one of his major themes—the study of anatomy. There is much popular hostility to it, he admitted, but argued that medicine cannot exist without the study of anatomy. Public disapproval of the dissection of cadavers is vehement. People regard a military victor who leaves thousands dead as a *hero* but view the anatomist with disgust. Many are alienated when the grave of a relative is disturbed. The student would do better to secure the cadavers from prisons, where multitudes who have seldom contributed to the well-being of society during life can be of service to their fellow-creatures after death. Godman remained at Rutgers for less than a year (1826-27), resigning because of ill health, variously described by his biographers as hypertrophy of the heart, disease of the lungs, and consumption or tuberculosis.

Hoping for a cure, Godman and his family spent February, March and April, 1828, in the West Indies. He returned to Germantown, Pennsylvania, in May with his wife and three children. Their only source of income now was Godman's writing. This had supplemented his income from teaching, for though he had great powers as an anatomical teacher, Godman's classes, Samuel Gross noted, were large but "unremunerative" (36). Godman was not successful as an operator; Gross records an incident when Godman, while in Cincinnati, lithotomized a man but was unable to remove the stone. The patient walked to Philadelphia where Dr. Gibson, at the University of Pennsylvania, removed it. Gross, who in 1829-30 was helping Godman translate the travels of the Duke of Saxe-Weimar, describes him as a sickly-looking man with a "clear, sonorous voice, interrupted at intervals by a hacking cough (37). Godman was undergoing medical treatments at this time; he described these to a friend (a piece of braid was inserted through the skin of his chest), but said that it was "too early to feel any particular good effect" (38).

While in Germantown, Godman wrote articles on natural history for the *Encyclopedia Americana*, finishing those up to the letter "C." Several of his earlier lectures and addresses, along with a short essay on the "Injurious Effects of Tight Lacing," were reprinted and appeared in 1829 as *Addresses Delivered on Various Public Occasions.* The observations Godman had recorded while in Anne Arundel County, Maryland, and some he had made while in Pennsylvania, now appeared as a series of articles in *The Friend*, a religious and literary weekly journal of Philadelphia. These were later reprinted with one memoir and another article to form *Rambles of a Naturalist*, published for the Society of Friends, 1833. Godman continued dissections in comparative anatomy, asking friends to bring him specimens and offering suggestions on how to pack them (39). In January, 1829, Godman was described by an acquaintance as in ill health, but very cheerful and interesting. If he should recover, the visitor writes, "it will be a great blessing to (his family), and an advantage to the public (40)." Godman survived a little more than a year, dying on April 17, 1830.

John Davidson Godman repeatedly stressed the physician's need for a good education. The science of anatomy is of great importance. An understanding of the interrelationships of the parts of the body is fundamental to the surgeon and necessary for the physician to understand the effectiveness of medicines. A knowledge of the changes caused by disease will enable the physician to recommend treatments which will restore the diseased part to its normal condition. The study of classical literature and of natural history taught the student how to think, a valuable asset in any profession. This ability to think will enable the medical student to formulate simple guidelines or general principles which will serve him throughout his professional labors and which will bring honor to himself and to the profession.

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William Williams Keen, M.D., and the Teaching of Artistic Anatomy[1]

By DONALD C. GEIST, M.D.[2]

HISTORICAL NOTES ON ARTISTIC ANATOMY

Fielding H. Garrison, in his small book (1) *The Principles of Anatomic Illustration before Vesalius. An Inquiry into the Rationale of Artistic Anatomy*, states that the real content of artistic anatomy is not descriptive anatomy but ethnic morphology, physiology and pathology. He adds that descriptive anatomy is fixed, static and stationary, but artistic anatomy is dynamic, progressive and vital.

The impulse to study human anatomy by frequent dissection and to make accurate drawings of the structures seen, according to Garrison, came not from physician-anatomists but from the great Florentine painters (2) of the Quattrocento. It came about when the artists applied for admission to the Florentine Guild of Physicians and Apothecaries, thus bringing together artists and physicians. Giotto was a friend of the physicians Dino del Garbo and Torrigiano. Luca della Robbia and the pathologist Benvieni were friends, as were Francia and the anatomist Achillini and Leonardo da Vinci and Marc Antonio della Torre. All of the great treatises on human proportion, except Dürer's, came from Florence. The painters at first assisted the doctors in their dissections and later began to do their own. The first artist to take up the scientific study of anatomy was apparently Donatello (1386-1466). Leonardo da Vinci did no less than fifty dissections in his lifetime, making over 750 drawings of these. Garrison (1) credits Leonardo as being the founder of artistic anatomy.

Progressing from these early days to the middle and end of the nineteenth century, artistic anatomy appears to have found its advocates in various European countries. Sir Charles Bell, a leading British anatomist, illustrated his works himself and lectured to artists on anatomy (3). His book, *Anatomy of Expression*, was a sequel to his studies. Robert Knox, a Scottish anatomist, the first to teach general anatomy from a descriptive, histologic and comparative angle, was an able writer on artistic anatomy (4). *Anatomical Studies of the Bones and Muscles for the Use of Artists* was published by him in London in 1883. Ernest Wilheim Brucke of Berlin was an important contributor and an active teacher of anatomy to art students and artists (5). In France, Paul Richer wrote and taught artistic anatomy, his beautifully illustrated book, *Artistic Anatomy*, having been republished in 1971 (6). V. M. A. Parkes (7) of London brought out a textbook, *Artistic Anatomy of the Human Form*, and John Marshall, in England, lectured for over 20 years on anatomy in the Government Schools of Design and was a professor in the Royal Academy of Arts (8). He published *A Series of Life-Size Diagrams of the Human Body*, especially adapted for art students, as well as an outstanding book, *Anatomy for Artists*.

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EARLY AMERICAN EFFORTS

Youthful America was making its start. The Pennsylvania Academy of Fine Arts, America's oldest art institution, occupied its first building in 1806. In 1812, its Board of Directors "resolved that in conformity with the request of the academicians, the board establish a professorship of anatomy, whose title shall be Professor of Anatomy of the Pennsylvania Academy of Fine Arts," and three of Philadelphia's outstanding physicians—John Syng Dorsey, Nathaniel Chapman and Thomas Hewson—were nominated for the professorship. At the next meeting of the Board, May 11, 1812, Nathaniel Chapman was duly elected professor of anatomy. In May, 1813, Chapman notified the board that he was ready to present his introductory lecture, the date to be selected by the Academy. The details about his lectures, their number, the subject matter and the time of presentation are missing, but Chapman continued as professor of anatomy until April 16, 1823, when his resignation (9) was accepted by the Academy.

Dr. J. Bell was unaminously elected as Chapman's successor. Further mention of Dr. Bell's teaching cannot be found in the archives of the Pennsylvania Academy. It is believed that the new professor was Dr. John Bell (10), who was born in Ireland in 1796 and emigrated with his family to Virginia in 1810, remaining there for five years. He then entered the medical school of the University of Pennsylvania, from which he was graduated in 1817, immediately beginning his practice in Philadelphia. For a time he was associated with Doctors W. W. Gerhard and Nathaniel Chapman and was widely known as a lecturer and popular writer. In 1851, dissatisfied at not receiving the appointment upon Chapman's resignation at the University, Bell left Philadelphia and became professor of the theory and practice of medicine at the Medical College of Ohio (11). In 1853 he returned to Philadelphia where he died in 1872.

The Pennsylvania Academy of Fine Arts, dedicated to art education from the time of its origin, continued to develop its art schools, which were started in 1813. There is a period between the time Dr. Bell left Philadelphia and the appointment of another professor for which there appears to be no information. In 1856, however, the Academy determined to present several courses of instruction without charge to the students, among them, "A Course of Lectures on Anatomy, of from 16 to 20 in number by a regular professor—the best the city can furnish." At the same time, a proposal of lectures to be given by Doctor A. R. Thomas was submitted. Amos R. Thomas (12) (13) was born in Watertown, New York and began his medical preceptorship with Dr. S. Potter in Syracuse, N. Y., later entering Syracuse Medical School from which he was graduated in 1854. He moved to Philadelphia and entered Pennsylvania Medical College, where he became professor of anatomy from 1856 until 1866. His professorship of anatomy at the Pennsylvania Academy extended from 1856 until 1870. His lectures were delivered at "The Amphitheatre of the Penn Medical School—Arch Street above 9th Street," and the dissections were done there. The courses, for each of which he was paid $50, were repeated throughout the years. In addition, Thomas also lectured on artistic anatomy at the Philadelphia School of Design for Women, from 1863 to 1871. In 1867, Thomas became professor of anatomy at Hahnemann Medical College and later the dean.

William Rimmer (Figure 1), artist, physician and musician, was one of the

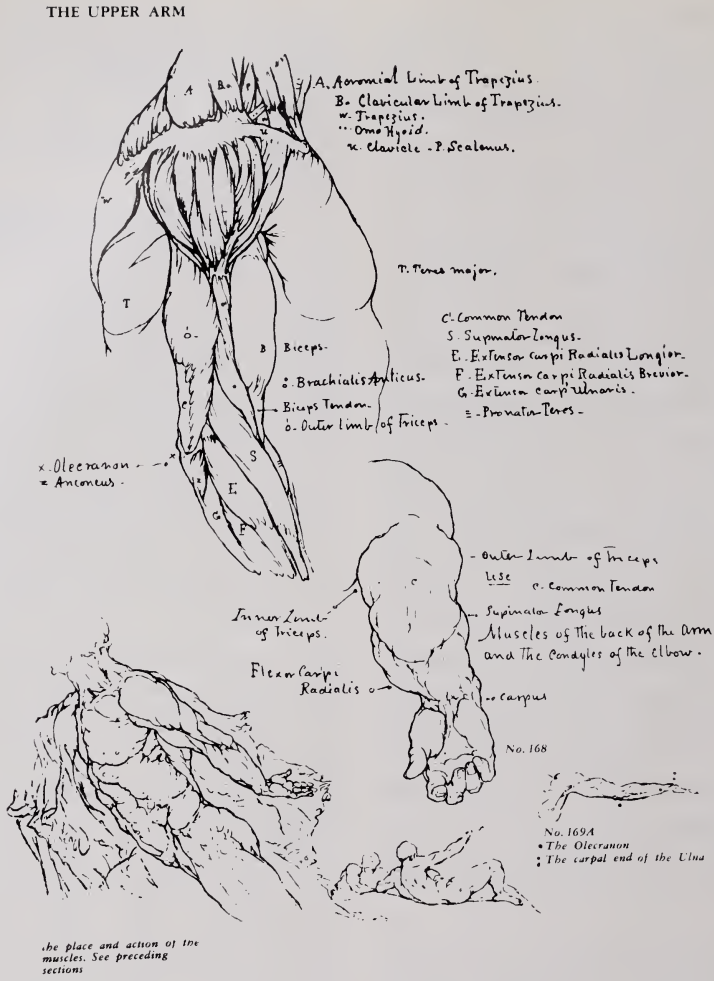

Fig. 1. The Place and Action of Muscles. From William Rimmer's *Art Anatomy*, 1884 edition. Copy given to the Library of The College of Physicians of Philadelphia by Dr. W. W. Keen. Courtesy of Fred Rogers, M.D.

early physicians who taught anatomy to art students. His biographer Bartlett (14) says, "Rimmer was the first artist on this continent who had a thorough art-knowledge and understanding of the human figure." From 1861 until 1866 he gave lectures and instructions in anatomy to literary people, artists and physicians. He lectured at the Lowell Institute in 1863 and from 1866 until 1870 at the School of Design of the Cooper Union for the Advancement of Science in New York. Rimmer also gave instruction on anatomy to the students of the School of Drawing and Painting when it opened in the Boston Museum of Fine Arts. His book, *Elements of Design*, appeared in 1864, and *Art Anatomy*, a beautifully illustrated work, was published in 1877 (15). Rimmer died in 1879. Unlike Rimmer, the above physicians were not artists.

WILLIAM WILLIAMS KEEN, M.D. (1837-1932)

William Williams Keen (Figure 2) was born in Philadelphia, Pennsylvania, June

19, 1837 (16). After preliminary education at Central High School and Saunder's Academy in this city, he entered Brown University, from which he was graduated in 1859. He remained for a fifth year of study in chemistry and physics. Keen began the study of medicine at Jefferson Medical College in 1860, becoming, at the same time, a private student with Doctors Jacob M. DaCosta and John Brinton. Chosen as assistant surgeon to the Fifth Massachusetts Regiment in 1861, he interrupted his medical education for a short time, then returned and was graduated from Jefferson Medical College in 1862. Keen pursued graduate education in Europe, studying with Pouelet in Paris, Virchow in Berlin and Connheim in Vienna.

The year 1866 found him starting private practice in Philadelphia and his teaching career at Jefferson. Appointed lecturer in pathological anatomy in 1866 he continued in this position until 1875. The Philadelphia School of Anatomy, then the country's only private school of this sort, came under Keen's direction from 1866 until it closed in 1875. From 1884 until 1889, Doctor Keen was

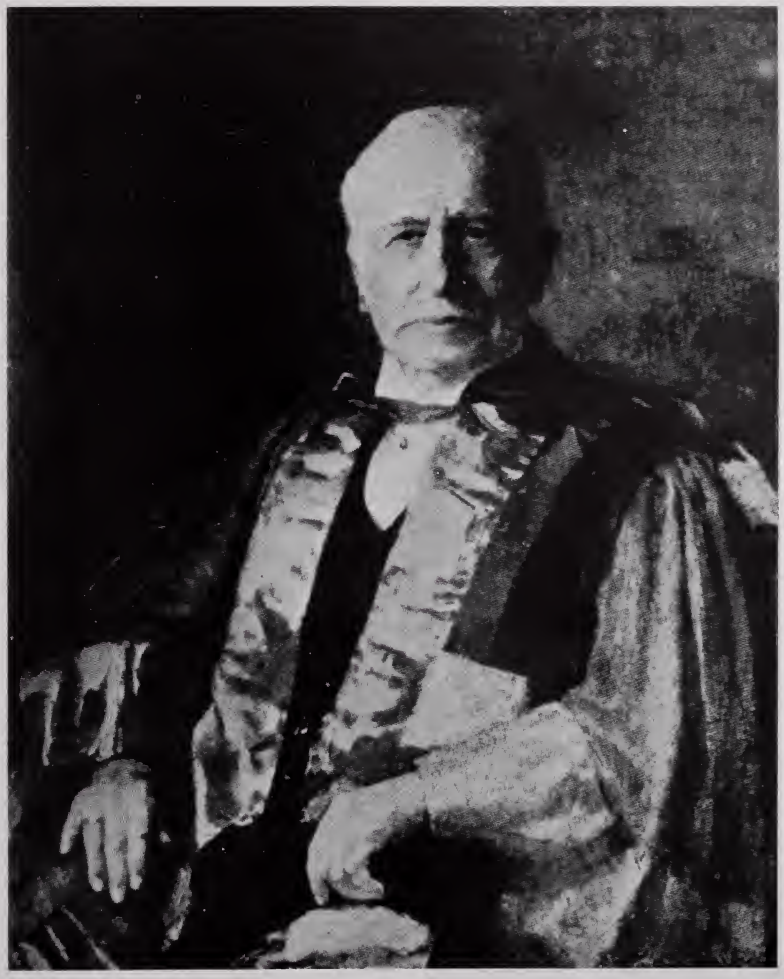

Fig. 2. William Williams Keen, M.D. (1837-1932), by Robert Vonnoh. From the portrait collection of William Bradley, M.D. Courtesy of The College of Physicians of Philadelphia.

professor of surgery at the Women's Medical College (now The Medical College of Pennsylvania). Upon the death of the younger Gross in 1889, he became professor of surgery at Jefferson Medical College, continuing until his retirement in 1907.

Doctor Keen was an accomplished, courageous, clinical surgeon and an outstanding teacher of surgery. He was a prolific writer on medical and non-medical subjects. His paper with Morehouse, "Reflex Paralysis and Gunshot Wounds," his *System of Surgery*, *The American Textbook of Surgery* which he edited and *Surgical Complications and Sequelae of Typhoid Fever* were outstanding contributions to the surgical literature.

Honorary degrees were presented to him by twelve different universities, including an honorary Ph.D. from Upsala. Among the official positions he held were president of The American Surgical Association, the American Medical Association, The College of Physicians of Philadelphia and The American Philosophical Society. He was an Honorary Fellow of the Royal Colleges of Surgeons of England, Edinburgh and Ireland. Keen was awarded the Bigelow Medal from the Boston Surgical Society, Colver-Rosenberger Medal from Brown University, the Gold Medal of the Pennsylvania Society of New York, the Order of the Cross of Belgium and the Legion of Honor of France. His long, extremely busy and varied life ended with his death on June 7, 1932.

A scrapbook belonging to Doctor Keen, in the Library of The College of Physicians of Philadelphia, contains a formal printed announcement (17), stating, "Doctor W. W. Keen's second course of lectures on artistic anatomy will begin Tuesday, December 8, 1874 at 12 o'clock." In his *History of the Philadelphia School of Anatomy*, published in 1875, Keen says that among the courses in anatomy given by him at the school were two in artistic anatomy (18). Doctor Keen, therefore, probably began teaching this subject in 1873. The lectures were given on Tuesday, Thursday and Saturday for about eight weeks. The subjects included anatomy of the bones and ligaments, the muscles, and skin with their influence on external forms both in repose and in action. They were illustrated with drawings, models, plaster casts and dissections, and tickets for the course were fifteen dollars.

DOCTOR KEEN'S TEACHING AT THE PENNSYLVANIA ACADEMY OF FINE ARTS

The Board of Directors of the Pennsylvania Academy of Fine Arts on December 13, 1875 (19) stated, "Professor Keen will deliver a complete artistic course on anatomy at ten dollars per lecture, including the providing of all proper materials for illustrating and explaining the subject, the course consisting of about twenty lectures." In the minutes of this meeting there appears a "programme" of anatomical studies of the Pennsylvania Academy of Fine Arts. It describes the subject matter of each of the twenty lectures and gives the date for each of them covering a period from October, 1876, until February, 1877. The lectures were to be given at 8 o'clock in the evening and were "open to all members of the classes for the study of the Antiques, of living models and of painting, as well as artists generally, free of charge."

Keen, in his first annual report (20) to the board of directors, states that his first course of lectures at the Pennsylvania Academy, 30 in number, began November 18, 1876, and continued until March 28, 1877. It would seem, therefore, that the times at which the lectures

Fig. 3. Anatomical Lecture by Dr. William Williams Keen, by Charles H. Stephens. Monochrome oil sketch, 1879. Courtesy of the Pennsylvania Academy of the Fine Arts.

were to be given were changed. The subject matter of the lectures, while worded differently from that in the above mentioned "programme," was essentially the same (Figure 3).

The following were the subjects of his lectures as described by Keen:

1. An introductory lecture.
2. Eight lectures on the skeleton.
3. Twelve and a half lectures on the muscles.
4. One on the nose.
5. One on the ear.
6. One and a half on the eye and its appendages.
7. Two on the subcutaneous fat and veins.
8. One on the hair and postural expression.
9. Two on influence of sex on the development of the body.

The lectures were given Wednesday and Saturday evenings, and Doctor Keen was paid ten dollars for each one. The Academy defrayed the expenses of models and subjects. Lectures were given to the public at ten dollars a ticket, the money from these being placed in a special endowment fund to establish a library on artistic anatomy. The actual skeleton, plaster casts of Keen's and of the Antique Collection of the Academy and dissection specimens were used to illustrate the lectures. The dissections were largely done by Thomas Eakins with the aid of students who participated with him. Dissections of the horse, cat and dog were also done to demonstrate comparative anatomy, and Eakins made casts of some of the dissections for use in the course. Live models, drawings, charts and galvanic stimulation of muscles to show their action were also employed. Live models were used only in the lectures to the students of the Academy and not to the public. The first group of students, both male and female, numbered 75, and the number gradually increased, reaching 200 in later years. Artists, students of the Academy and "escorts for the ladies" were not charged a fee.

Keen, in the report of his first course to the Board of Directors of the Academy, offered several recommendations. He urged that the lectures be given to the public, claiming that this would improve the general taste and culture of the community and would increase the number of friends and benefactors of the Academy. The establishment of a room for dissection by the students was strongly advocated, arguing that they learn best by doing actual dissections. This was accepted by the Academy, and shortly the pump room (Figure 4) was converted into a room for dissection (21). The library was a major concern. Doctor Keen obtained two hundred dollars and expected another one hundred dollars which he offered as the beginning of a permanent endowment fund for the library. He proposed a list of books on artistic anatomy and related subjects, and 47 books were added to the Academy's library at a cost of about three hundred dollars. This apparently resulted in an adequate collection, for

Fig. 4. The Dissecting Room by Thomas P. Anshutz. Monochrome oil sketch, 1879. Courtesy of the Pennsylvania Academy of the Fine Arts.

Marshall stated, in 1852, that 62 books on artistic anatomy had been published from 1585 to 1850.

Perhaps Keen's most important recommendation was the appointment of an additional teaching staff. This was approved by the Academy and in his second year of teaching consisted of the following:

Chief Demonstrator—Thomas Eakins (Figure 5)

Assistant Demonstrators—James Kelly, Augustus Daggy, Benjamin McCord, Thomas Anshutz and Paul Peel.

All of the assistant demonstrators were then students at the Pennsylvania Academy of Fine Arts, some of them later becoming famous artists.

Changes in the curriculum came with the years. Keen's third annual report (22) states that 37 lectures were given by adding another lecture on the bones and muscles, one on proportions and one on the comparative anatomy of the skeleton. As part of their education, the students prepared a table of proportions of about 30 parts of the body at birth and 30 years of age. Much of the material for this was taken from Quetelet's book and converted to the English scale. During this year, the student assistants did all of the dissections for Keen and demonstrated them to the students in the life classes. In this report Keen suggested some sort of recitation or examination be devised to judge student progress in the course. He contributed another one hundred dollars to the library fund and announced additional books: Schadow's *Polyelet*, Marshall's *Anatomy for Artists*, Fair's *Colored Atlas* and Chauvreau's *Domestic Animals*.

The lectures on the effect of sex on the development of the body were discontinued, the Academy fearing unfavorable criticism by the public. Keen also noted that the course was beginning to exert some influence in this country and particularly England. In his fifth annual report (23), Keen announced that Thomas Anshutz replaced Thomas Eakins as chief demonstrator and that

Fig. 5. Anatomical Model of Torso, Front by Thomas Eakins. Plaster tinted in natural colors, 1880. Courtesy of the Pennsylvania Academy of the Fine Arts.

women students, tried as demonstrators, were found entirely satisfactory.

THE ART STUDENT AND COLOR BLINDNESS

Keen constantly showed a personal interest in the welfare of his students, art and medical, as is well shown by the following incident. He recommended that the students of the Academy be examined for color-blindness (22), "in order that they might not waste their time in studies in color, continue only with black and white or pursue no course." The examination was first done by one Philadelphia's ophthalmologists, Doctor William Thomson. Of 76 men examined, one was found to be color-blind but none was found to be so among the twelve women examined. Keen suggested to the Academy that all students be examined for color-blindness, stating that if the academy would secure Dr. Thomson's test instruments for determining the defect, Keen would then examine the students without charge.

As one might expect, there were those who did not completely agree with anatomical instruction for art students. They questioned mainly the importance of dissection in the teaching of students of art. The fear was expressed that the anatomical knowledge acquired by them would destroy their imagination and decrease their creative abilities and ideas. This skepticism is well shown in a paper, "The Art Schools of Philadelphia with Illustrations by Pupils," published by *Scribner's Monthly* in 1879 (24). The authors discussed two fears which they believed inherent in the course, i.e., "One is the danger of acquiring the habit of looking for anatomy and nothing else—and the other, none the less important, in that it is insensible and impalpable, the danger arising from constant association with what is ugly and unpoetic, however useful, instead of even occasional association with what is poetic and beautiful, however useless." Keen and Eakins disagreed and defended the courses and the need for dissection. Keen replied, "It is not a study of pure anatomy but of anatomy in its relation for form; not to make anatomists but artists." There were other skeptics but in general the teaching of artistic anatomy to art students and artists was well accepted.

OTHER TEACHING BY DOCTOR KEEN

There is some evidence to show that Doctor Keen gave other lectures and possibly similar courses. A letter from the Pennsylvania Museum of the School of Industrial Art (now the Philadelphia College of Art and formerly the art school of the Museum of Art) thanked the Pennsylvania Academy for lending casts and preparations to Doctor Keen for his lecture to students at that institution. Unfortunately the archives of this school are incomplete and nothing further could be found about the lectures. Among his collected papers in the Library of The College of Physicians of Philadelphia is an unfinished, handwritten manuscript by Keen of an outline for a book on *Artistic Anatomy* (25). The author ends it with a chapter entitled "Proportions," but the book was never written.

It is interesting to find that Keen carried into his surgical teaching some of the methods used in education on art anatomy. In a paper on surgery of the knee, read before the Anatomical and Surgical Society of Brooklyn, he used a live male model to illustrate the anatomy involved (26). In 1881 he wrote a paper, "On the Systematic Use of the Living Model as a Means of Illustration in

Teaching Anatomy," strongly urging anatomists and surgeons to use live models in their teaching (27). An abridged form of this paper was included by him in his edition of Gray's *Anatomy* (28). His editing of Holden and Shuter's *Landmarks, Medical and Surgical* shows some of the same conviction.

CONCLUSION

Doctor Keen was a man of great curiosity and multiple, varied interests, almost always writing about them. Important among these was his teaching, not only of descriptive anatomy, but artistic anatomy as well. To this he brought the same talent, devotion and skill as a teacher that he used in the teaching of surgery. The students of the Pennsylvania Academy of Fine Arts must have profited greatly by this addition to their training and its help in preparing them for their careers as professional artists. Indeed, on several occasions, they testified to this by submitting to the Board of Directors of the Academy formal resolutions expressing their appreciation of the course of anatomy and thanking the board for arranging for the courses in anatomy. One might surmise that, for Keen himself, it was a pleasurable and stimulating work.

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Memoir of Helen Ingleby 1887–1973

By MARION FAY, Ph.D.

Helen Ingleby was a gifted, attractive woman with a wide range of interests. Born in Ilford, England, she was the only daughter of Holcombe Ingleby and his wife, Harriet Jane Neville-Rolfe. Her father was a member of Parliament and three times Mayor of King's Lynn in Norfolk; her mother's family was also very prominent. The John Rolfe who married Pocahontas was of that family.

At eighteen Helen began the study of piano at the Royal College of Music but became interested in medicine and entered the London School of Medicine for Women at the Royal Free Hospital. She completed her undergraduate studies in 1914, receiving all the first prizes with "special proficiency" in anatomy and physiology.

Following her graduation she served in a hospital in Cherbourg as a medical orderly where she saw the breakdown of the French medical services and the terrible condition of the wounded soldiers. On her return to England, she received an appointment at St. George's Hospital in spite of the acrimonious quarrel then going on about admitting women to medicine. From 1916 to 1923 she held various medical posts until she received one of the first Rockefeller Medical Fellowships, to study neurology at Johns Hopkins. On her return to England she carried on research in Cambridge, but the very difficult postwar conditions in Britain influenced her to accept an offer from the Woman's Medical College of Pennsylvania to head the Department of Pathology. For twenty years she taught medical classes and served as the chief pathologist for the College Hospital. In spite of this heavy schedule she began research on the anatomy and pathology of the breast and published important papers and prepared exhibits on this subject. From 1945 until 1958 she held positions at the Albert Einstein Medical Center in Philadelphia, first as Hospital Pathologist and then as Research Pathologist in the Department of Radiology. With Dr. Jacob Gershon Cohen she continued her research and with him published the *Comparative Anatomy, Pathology and Roentgenology of the Breast* in 1960, a classic in its field.

She retired to England where her family had lived and resided in Church House, Heacham, until her death on February 21, 1973, in her 86th year. There in the village church are graves and monuments for her ancestors and there is a tablet in memory of John Rolfe.

These facts of her career give no hint of the very special flavor of this unusual woman. In a charming house on the outskirts of Philadelphia she raised Chesapeake retrievers and on her visits home introduced the breed to England. She showed her dogs and attended field trials which she enjoyed, not just to have her entries win but because of her keen interest in animals. She entertained her students often and involved them in her many projects; the dogs, gardening, the raising of flowers and vegetables. She expected her students to share her enthusiasm for dogs and gardening as well as for medicine. She never quite lost her feeling that British medicine was superior to the American brand. When I wanted to convince her in an argument, I

found it helpful to show her an article published by a *British* author in a *British* journal. One of her great friends was Dr. Maude Abbott, whom she first met in Baltimore and who recommended her to the College for her post in pathology. Dr. Abbott visited the College many times and her pathological conferences were enlivened by the brisk give-and-take between "Maudie" and "Helen."

Helen Ingleby's enthusiasm, optimism and courage persisted through her declining years. Her memory lives vividly among her former colleagues and students who admired and fondly recall this gifted and unusual woman.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of Ruth Hartley Weaver 1893–1973

By FRIEDA BAUMANN, M.D.

Ruth Hartley Weaver died at Lakewood Nursing Home, Burlington, New Jersey, of a stroke, on August 29, 1973.

She was born in 1893 in Palmyra, New Jersey. Her mother died when she was eight years old; her brother's wife, Dr. Harriet Hartley, cared for her and her sister all through her life. She was graduated from Philadelphia High School for Girls in 1912 and attended Wellesley College in 1912-13. Inspired by Dr. Harriet Hartley, she decided to study medicine, and in preparation for medical school she studied at Medico-Chi in the summer of 1913. That autumn she entered The Woman's Medical College of Pennsylvania and was graduated as the youngest girl in her class in 1917. She then interned at Philadelphia General Hospital in 1917-18. In 1941 she received a master's degree in public health from the University of Pennsylvania.

Dr. Weaver was associated with the Philadelphia Department of Public Health from October, 1918, to May 31, 1924, as child hygiene physician.

In 1924 she was married to Harry Sands Weaver, Sr., also a physician. After her husband's death in October, 1936, she was reappointed to her former position. In 1937 she became epidemiologist at the Department of Public Health and in April, 1940, was appointed registrar of vital statistics. In 1942 she was made assistant director, Division of Medical Services of the Board of Public Education, remaining in this position until 1950, when she was made director. She held this position until her retirement in 1960.

She acted as guest lecturer in Public Health at the University of Pennsylvania School of Medicine and at Hahnemann Medical College. From 1944 to 1949 she was acting associate professor of preventive medicine at The Woman's Medical College and associate professor of school health from 1949 to 1958.

Ruth Weaver was vice president of the Cystic Fibrosis Research Institute of Pennsylvania, and a member of the Heart Association of Southeastern Pennsylvania and the Philadelphia Mouth Hygiene Association.

She was president of the American School Health Association, Philadelphia Pediatric Society, Blockley Society of Philadelphia General Hospital, and the Philadelphia Club of Medical Women.

She held the vice presidency of the Public Health Association, Region One, City of Philadelphia. She was also a member of the Board of Directors of the Young Women's Christian Association.

Dr. Weaver wrote many articles on public health and child care, for example, care of handicapped pupils with hearing difficulties, crippled children, infections in school populations, cooperation of parents and private physicians, and others related to child health and education for the *American Journal of Public Health*, *Annals of Internal Medicine*, *Philadelphia Medicine* and *Journal of American Medical Women's Association*.

Her awards include Medical Woman of the Year (1956), Outstanding Work in the Betterment of Child Health (1958), Award of Merit from the Pennsylvania

Public Health Association (1959), and the Louis Braille Award (1960).

Even living this full professional life, Ruth had time for rest and recreation at the shore. She had an apartment in Atlantic City. She also enjoyed travel to distant lands. Her favorite hobby was hand weaving. She produced many beautiful patterns in wool which became very good-looking tailored suits.

By many who worked with her, she was considered a good administrator, a good teacher and progressive in her ideas.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

Memoir of Marston True Woodruff 1905–1973

By ROBERT P. BARDEN, M.D.

Marston True Woodruff, M.D., was born on March 13, 1905, at Webster Groves, Missouri. He attended elementary school in Winnepeg, Canada, and Chicago, Illinois, and then moved to Philadelphia, where he entered Frankford High School, graduating in the class of 1923. He did his undergraduate work at the University of Pennsylvania and then entered Jefferson Medical School on a Philadelphia Board of Education Scholarship. His M.D. was awarded in 1930.

He interned at Frankford Hospital, Philadelphia, and, after a few years of general practice in Northeast Philadelphia, he entered a two-year residency program in radiology at Mt. Sinai Hospital in New York City and became a diplomate of the American Board of Radiology in 1935. Thereupon he returned to Philadelphia and became associated with Dr. Francis F. Borzell in the practice of radiology at Frankford Hospital, at Mt. Holly, N.J. Hospital, and at a private office at 4940 Penn Street, Philadelphia. When Dr. Borzell retired, Dr. Woodruff became head of the Department of Radiology at Frankford Hospital in 1948 and twice served two-year terms as president of its medical staff. In 1970, Dr. Woodruff gave up hospital practice but maintained his private office until the time of his final illness. He was also serving as radiologist at Friends Hospital, Philadelphia, at this time, and as a consultant in radiology at both Frankford Arsenal and the Army Hospital at Fort Dix, N.J.

As a reserve medical officer, Dr. Woodruff entered service in the Army Medical Corps in July, 1941, and served until his separation as a lieutenant colonel in February, 1946. He was head of the Department of Radiology at Tilton General Hospital, Fort Dix, N.J., for four years and then spent six months in a similar position in an Army Hospital on Tinian Atoll in the South Pacific.

Dr. Woodruff held many positions in medical and community organizations during his days of practice in Philadelphia. He was a past president of the Philadelphia Roentgen Ray Society, a former vice president and treasurer of the Philadelphia County Medical Society, and a former vice president of the Pennsylvania Radiological Society. He was very active on the Board of the American Cancer Society for many years, serving as secretary of the Philadelphia Division at the time of his death. He was particularly interested in the Public Information Committee's work for the American Cancer Society, and spent many hours organizing and speaking to local citizens' groups. Shortly before his death he was honored with a special award for outstanding service by the Philadelphia Board of the American Cancer Society and was elected to Honorary Life Membership. His community interests also included service on the vestry of All Saints Episcopal Church, Torresdale, for many years.

Dr. Woodruff was a fellow of The College of Physicians of Philadelphia, a fellow of the American College of Radiology, and a member of the Radiological Society of North America. He also was a member of the Board of the Philadelphia Medical Club and the Physicians' Motor Club.

He married the former Viola Habel in

June 1930, and she survives him with their three children: Charles Lawrence, M.D., a radiologist at Chestnut Hill Hospital, Constance Woodruff Atwell, a Ph.D. in psychology and associate professor at Pitzer College, Claremont, California, and Stephen Marston, M.D., a resident in obstetrics and gynecology at McGee Women's Hospital at the University of Pittsburgh. The Woodruffs lived in Crestmont Farms, Torresdale, for many years and then moved to Rydal, Pa., about ten years ago. They lived at Foxcroft Square Apartments, Jenkintown, Pa., at the time of Dr. Woodruff's death.

Dr. Woodruff's main hobbies were traveling and photography. He and his family toured the entire United States and much of Mexico and Canada by car, and later he and Mrs. Woodruff flew to many parts of the globe, including Europe, the Middle East, the Orient, India and East Africa.

He died on September 8, 1973, of a malignant glioma of the brain, after an illness of eight months, and was buried at Whitemarsh Memorial Park, Prospectville, Pa. Services were held at St. John's Episcopal Church, Huntingdon Valley, Pa.

So much for facts. Can one compress a life within this printed page? Can one evoke the image of the man as he lived throughout his years, solid, dependable, responsible in his service to others?

"Woody," beneath his reserve, was a very human person with a gentle laugh and quick sympathy, radiating kindness like a warm glow. Perhaps, however, he will be remembered best for his unswerving dedication to the practice of medicine and his compelling commitment to the even larger field of service to mankind.

This memoir was prepared and published at the request of the Council of The College of Physicians of Philadelphia.

The College of Physicians of Philadelphia

New Fellows Elected July 1, 1973–January 1, 1974 (Resident, Non-Resident and Honorary)

Resident Fellows

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Frederic Bass, M.D. (Western Reserve, 1959); W-46 Dietrich Hall, University of Pennsylvania, Phila., Pa. (19174). Proposed by Elizabeth K. Rose, M.D. and Robert L. Leopold, M.D.

George D. Beck, M.D. (Univ. of Penn; 1936); 8813 Germantown Ave., Phila., Pa. (19118). Proposed by Matthew J. Zakreski, M.D. and Charles T. Lee, Jr., M.D.

Mark L. Belafsky, M.D. (Chicago Med. Sch., 1964); 905 Kings Highway, N., Cherry Hill, N.J. (08003). Proposed by Louis E. Silcox, M.D. and Eugene B. Rex, M.D.

Randall W. Bell, M.D. (Cornell, 1966); 910 DeKalb St., Norristown, Pa. (19401). Proposed by George Spaeth, M.D., T. D. Duane, M.D. and Joseph Waldman, M.D.

Vernon J. F. Brightman, D.D.S. (Univ. Queensland, Brisbane, Australia, 1952); Bldg. 10, 3d fl. PGH, 3400 Civic Center Blvd., Phila., Pa. (19104). Proposed by T. F. McNair Scott, M.D. and Raymond Werther, D.D.S.

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